Geophysical Abstracts

Volume 15

Nos. 116-119
1944

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JOHNSON REPRINT CORPORATION

KRAUS REPRINT CORPORATION

NEW YORK
1964

PRINTED IN UNITED STATES OF AMERICA

C. 7285 May 1944

UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

INFORMATION CIRCULAR

GEOPHYSICAL ABSTRACTS 116

JANUARY-MARCH 1944

COMPILED BY

W. AYVAZOGLOU AND V. SKITSKY

I.C. 7285,
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GEOPHYSICAL ABSTRACTS 116
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Compiled by W. Ayvazoglou 2/ and V. Skitsky 2/

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FOREWORD

Geophysical Abstracts 1 - 86 were issued in mimeographed form by the Bureau of Mines; Abstracts 87 - 111 were published in bulletins of the Geological Survey; Abstracts 112 - 115 were issued in mimeographed form by the Bureau of Mines as Information Circulars 7256, 7257, 7267, and 7273.

ADDENDUM: In Geophysical Abstracts 115, p. 6, no. 7144, lines 2-3, the expression "observed and adopted values H, Z, D" refers to base-line values. The publication, however, includes also tables of hourly mean values H, Z, D and of diurnal variation.

1/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7285."

2/ Physical science analytical editor, Bureau of Mines, U. S. Department of the Interior.

1. GRAVITATIONAL METHODS

7253. Arkhangelsky, A. D. Geological Results of the General Magnetometric and Gravimetric Surveys of the U.S.S.R. (in Russian). Internat. Geol. Cong., Rep. of the 17th Sess., Moscow-Leningrad, 1937, vol. 1, Moscow, 1939, pp. 241-250.

Geophysical methods have been used in the U.S.S.R. to study geological problems. Such is the case of the general magnetometric and gravimetric surveys made jointly by the Main Physical Observatory, Main Office of Geodesy and Cartography, Institute of Terrestrial Magnetism, and Main Office of Geophysical Prospecting. Some institutions supplied the data, others processed them. Geological interpretation was made by the author. (1) Regional magnetic anomalies in the plains of the U.S.S.R. are traceable to the folded substratum overlain by sedimentary rocks; these anomalies promise to yield data characterizing the substratum in respect to strike and depth. Anomalies in European U.S.S.R. suggest that the pre-Cambrian substratum of the East European plateau consists of elements of different ages. In the most ancient of them, the main strike of the folding is almost latitudinal; in the younger ones, the folding is oriented in the meridian. (2) The Faye and Bouguer gravity anomalies are caused primarily by differences in the density of rocks composing the upper crust and by unknown processes producing changes of density at depth; these processes are not connected with isostatic movements. The anomalies in the European and adjoining Asiatic U.S.S.R. promise to indicate the volume of the pre-Cambrian massif of the east-European plateau and to clarify the interrelations between the Ural, Tian-Shan, and Donetz Basin folding systems, as well as between the Dnieper-Donetz depression and the mid-European depression. - V. S.

7254. Clark, S. K. Classification of Faults. Bull. Am. Assoc. Petrol. Geologists, Tulsa, Okla., vol. 27, No. 9, 1943, pp. 1245-1265.

A proposed classification of faults is based upon the type of mechanical failure involved. The types recognized are (1) normal diagonal shears, (2) reverse diagonal shears, (3) horizontal faults, (4) tension faults, (5) lateral shears, and (6) vertical shears. The types are diagrammed and, with the exception of vertical shears, are described on the basis of actual occurrences. - Author's abs.

7255. Dryden, H. L. Absolute Gravity-Determinations. National Research Council, American Geophysical Union, Transactions of 1943, Part I, Washington, D. C., 1943, pp. 42-43.

The U. S. National Research Council Committee on Fundamental Physical Constants recently appointed a Subcommittee on Gravity to study the various determinations of the absolute value of gravity and to recommend a "best" value. This Subcommittee found only three determinations deserving consideration: (1) F. Kühnen and Ph. Furtwängler, Geodetic Institute, Potsdam; (2) P. R. Heyl and G. S. Cook, National Bureau of Standards, Washington; and (3) J. S. Clark, National Physical Laboratory, Teddington. These determinations were reduced to values referred to the National Bureau of Standards 1936 gravity-station at Washington, D. C., by means of corrections for local relative gravity-values. As a result, comparable absolute gravity-values were obtained and are cited. The final recommendation of the Subcommittee is 980.083 0 gals as the "best" value for absolute gravity at the N.B.S. 1936 station, Washington, D. C. - V.S.

7256. Eby, J. B. Geophysical History of the Iowa Field, Calcasieu and Jefferson Davis Parishes, Louisiana. Geophysics, Menasha, Wis., vol. 8, No. 4, 1943, pp. 348-355.

The discovery well of the Iowa field was drilled in October 1931, and the field has produced 48,000,000 barrels of oil to date. The history of the early refraction seismograph, gravity, and reflection seismograph exploration of this important field is presented. - Author's abs.

7257. Garner, C. L. Scientific Economic Value of Basic Gravity Data. Proc., Eighth Am. Sci. Cong., 1940, Washington, D. C., vol. 7, Physical and Chemical Sciences, 1942, pp. 63-65.

Gravity data are at present used in both scientific research and practical exploration. As a result, the demand for them is increasing. Accordingly, the U. S. Coast and Geodetic Survey has recently undertaken to provide basic data for all general purposes. The geophysicists need these data as controls of local surveys; most gravimeters are built on the principle of the spring and require frequent standardization at base stations. Many gravimeters are extremely accurate, giving values to 1/10 milligal. A vast amount of such information in the United States awaits processing. Efforts have also been made to extend observations beyond continental United States. The Navy has carried out, jointly with other organizations, three gravity-at-sea expeditions in the general region of the West Indies and the Caribbean Basin. The Coast and Geodetic Survey has cooperated with other organizations in making observations on Cuba and in the Bahamas. - V. S.

7258. Gorshkov, P. M. Gravity Knowledge of the Eastern Part of the U.S.S.R. (abs.). Internat. Geol. Cong., 17th sess., U.S.S.R., 1937; Abstracts of Papers, Moscow, 1937, p. 186.

Insufficient gravity surveying has been done so far in the eastern part of the U.S.S.R., which includes western and eastern Siberia, the northeastern part of Kazakh SSR, and the Far East. Gravity stations here still form regional systems. The results of observations show that gravity anomalies, such as Faye, Bouguer, and isostatic, are present everywhere. The absolute values of anomalies do not differ markedly for plains and mountains. In some hilly localities isostatic anomalies are more informative geologically than other anomalies, such as Faye. The general conclusion for eastern U.S.S.R. is that most of the area is isostatically balanced. - V. S.

7259. Gunn, Ross. A Quantitative Study of the Lithosphere and Gravity Anomalies Along the Atlantic Coast. Jour., Franklin Inst., Lancaster, Pa., vol. 237, No. 2, 1944, pp. 139-154.

The principle of isobaric equilibrium is quantitatively applied to a strong lithosphere near a continental boundary. Following methods outlined in earlier papers, the deformation of the lithosphere near Cape Henry is determined from the magnitude and distribution of the sedimentary and fluid load superimposed upon the original crystalline basement. From the calculated figure and the equivalent load, the resulting distribution of vertical stress and gravity defect are estimated. Except for the prediction of appreciable positive gravity defects at the continental shelf, the calculated and observed gravity distributions are quite similar. The fibre stress due to the deformation is evaluated, and it is shown that the position of the calculated maximum stress in tension on the landward side coincides with the observed position of lithospheric failure or the Fall Line. The strength in tension of the upper lithosphere here is shown to be less than (8.5×10^8) dynes/cm.^{2} The simultaneous prediction of the approximate magnitudes of the gravity anomalies, their distribution, and the location of the Fall Line appears to show that a strong elastic lithosphere characterized by the constant $b = 8.4 \pm 2 \times 10^{-8}$cm.$^{-1}$ has a real and important geological existence. The investigation shows that, owing to the finite strength of the lithosphere, long linear areas parallel to continental coast lines are usually regions of disturbed gravity. - Author's abs.

7260. Hess, H. H. Peridotite Intrusions, Gravity Anomalies, and Island Arcs: A Contribution to the Ophiolite Problem (abs.). Internat. Geol. Cong., 17th sess., U.S.S.R., 1937, Abstracts of Papers, Moscow, 1937, pp. 182-183.

In the East and West Indies the peridotite intrusions are situated rallel to strong negative gravity anomalies. These intrusions can be so found in other strongly deformed mountain systems. Apparently, ey always occurred when the mountains were in an island-arc stage development. Other environments do not seem to bring about such trusions. As an explanation, V. Meinesz' downbuckling theory of gravity omalies and structural experiments of Kuenen are cited. It is further stulated that the peridotite magma is a water-rich product of partial sion of the peridotite substratum. It migrates up the vertical structures the down-buckle immediately after this buckle has been shoved into the ridotite substratum. Soon thereafter the bottom of the buckle becomes aled, and no further eruptions take place. - V. S.

61. Klaus, H. Faulting in the Billings Oilfield, Oklahoma, as Interpreted from Torsion-Balance Data and From Subsequent Drilling. Geophysics, Menasha, Wis., vol. 8, No. 4, 1943, pp. 362-378.

An abstract of this paper appeared in Geophysics, vol. 8, No. 3, 43, p. 325 (see Geophy. Abs. 114, No. 7010). - V. S.

62. Lagrula, Jean. L'Emploi de la gravimetrie dans l'etude de la structure géologique de l'Algérie. (Abstract, The Use of Gravimetric Method in the Study of the Geological Structure of Algeria). Internat. Geol. Cong., 17th sess., U.S.S.R., 1937, Abstracts of Papers, Moscow, 1937, p. 189.

Gravimetric surveying in Algeria was done with the Holweck-Lejay paratus. This instrument measures the time, T, related to local gravity, g", by the formula: $g = g_a - \frac{k}{T^2}$. Herein g_a and k are constants for two ference stations determining gravity in absolute figures. The gravity mputed from this formula must be corrected for the Faye, Bouguer, d topographical corrections, giving the corrected "g_o". Gravity anomaes are then calculated as the differences ($g_o - \gamma_o$), where γ_o is the theotical value of gravity; this value is determined on the basis of the pressive increase of the earth's density from the surface to the center. he results of the Algerian survey were interpreted in terms of the isoatic theory. According to this theory, islands and shore belts are isoatically positive, and inland regions isostatically negative. Findings, rtly supplied by the present investigation, confirm this distribution, if e Sahara desert is regarded as a sea and the Sahara plateau as a conent. They give for Tougourt, + 41; Guerrara, - 26; Ghardaia, - 4; lomb-Béchar, - 33; Taghit, - 17; and Béni-Abbés, - 26. - V. S.

7263. Lockenvitz, A. E. The Periodic Variations of the Gravitational Force (abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, pp. 325-326.

A commercial LaCoste-Romberg gravity meter has been operating as a self-recording meter since last August. The recorded curves have been compared with those obtained from calculations on a rigid earth theory. The nature of the differences and some possible interpretations will be discussed.

7264. McCollum, E. V., and Brown, Andrew. Use of the Gravity Meter in Establishment of Gravity Bench Marks. Geophysics, Menasha, Wis., vol. 8, No. 4, 1943, pp. 379-390.

Data are presented showing comparisons between various gravity meters and networks of gravity-meter bench marks. Methods of adjustment of networks for closure are suggested. Ties to pendulum stations of the U. S. Coast and Geodetic Survey and the Dominion Observatory of Canada afford a basis for the calibration of the gravity meters used and the evaluation of the gravity-meter bench marks in terms of the world gravity network. Probable errors and accuracies are discussed. - Author's abs.

7265. Nettleton, L. L., and Elkins, T. A. Association of Magnetic and Density Contrasts with Igneous Rock Classifications. Geophysics, Menasha, Wis., vol. 9, No. 1, 1944, pp. 60-78.

An abstract of this paper appeared in Geophysics, vol. 8, No. 3, 1943, p. 328 (see Geophys. Abs. 115, No. 7147). - V. S.

7266. Zamorev, A. A. A Study of the Two-dimensional Reversed Problem of the Theory of the Potential (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Sér. Geog. Geophys., Moscow, No. 4/5, 1941, pp. 487-500.

The two-dimensional reversed problem of the theory of the potential is generally formulated as follows: There are given on a line situated outside a disturbing body the values of a derivative of the potential; it is necessary to determine by means of these values the data characterizing the shape, location, and density of the disturbing body. The present paper deals with the following aspects of this problem: (1) The unidecimal determination of values characterizing the disturbing body according to the external gravitational potential; (2) the analytical prolongation of the derivative of the potential; (3) the analytical prolongation of the

ivatives of the potential in the particular case of one disturbing body ited by analytical curves; and (4) the determination of the shape of a -dimensional disturbing body. These questions are treated in terms ntegral calculus. - V. S.

2. MAGNETIC METHODS

khangelsky, A. D. Geological Results of the General Magnetometric and Gravimetric Surveys of the U.S.S.R. (in Russian). Internat. Geol. Congress., Rept. 17th sess., Moscow-Leningrad, 1937, vol. 1, Moscow, 1939, pp. 241-250 (see Geophys. Abs. 7253).

37. Bronstein, K. G. Some Ideas on the Relationship Between Geomagnetic and Geological Data (abs.). Internat. Geol. Cong., 17th sess., U.S.S.R., 1937, Abstracts of Papers, Moscow, 1937, p. 185.

The relationship between magnetic and geological data cannot be plained by the induction hypothesis and does not depend on any one gle factor. Exploration has shown that magnetic fields are distorted only by accumulations of ferromagnetic minerals, but also by pre-mbrian ferro siliceous rocks. Moreover, direct calculations of mag-tization intensity for rocks of the Kursk Magnetic Anomaly give values veral times those produced by induction. Finally, the relationship be-een centers of secular magnetic variations and geological factors does agree with the induction hypothesis. An explanation must be sought in hypothesis of residual rock magnetization occurring during tectonic ocesses. With a view to such solution, the author has studied the secular d day variations of geomagnetism in anomalous areas and found a rela-nship between the intensity of variations and the values of magnetic rce; an investigation of telluric currents also became necessary. In actical geological questions, in mapping structures; and in interpreting gnetic data, a small number of magnetic surveys and a comparison th gravity data should suffice. The comparison can be made in terms the "local magnetic constant $g = \sqrt{H^2 - (-\frac{Z}{2})^2}$, analogous to gravity nsity. The relief map of K.M.A. quartzites plotted according to this thod coincides fully with the local geology. - V. S.

38. Fleming, J. A. Researches in Terrestrial Magnetism and Electricity at Department of Terrestrial Magnetism, Carnegie Institution of Washington, for the Year April 1942 to March 1943. Nat. Research Council, Am. Geophys. Union, Trans. of 1943, pt. I, Washington, D. C., 1943, pp. 229-234.

The Carnegie Department of Terrestrial Magnetism has restricted its ordinary program during the year 1942-43, devoting much attention to war problems. The topics of principal research are reported under six headings: (1) Geomagnetic investigations: world distribution of magnetic anomalies, world isoporic charts, tables to correct field observations for post-perturbation and annual variation, reduction of field observations to mean of day on a world scale, notes on isomagnetic charts, etc. (2) Geoelectric investigations: relative effects of the wind on the two signs of conductivity, comparison of simultaneous atmospheric-electric data on sea and land, electrode effect in the atmosphere, etc. (3) Nuclear physics: pressure electrostatic generators, tests of magnet and vacuum systems in the 60-inch cyclotron installation, etc. (4) Observatory work: geomagnetic, geoelectric, ionospheric, and meteorological observations at Huancayo and Watheroo Magnetic Observatories; correlation of geomagnetic, ionospheric, and auroral work in polar regions at the College Observatory, Alaska; etc. (5) Survey work: determination of secular variation and new distribution data chiefly by the cooperating agencies, etc. (6) Ionospheric investigations: measurement of intensity of the earth's magnetic field in the ionosphere, observations during magnetic storms, etc. The Department's activities are set forth in greater detail in the Year Book No. 41 of the Carnegie Institution of Washington. - V. S.

7269. Hallimond, A. F. Magnetic Explorations by the Geological Survey. Abs., Proc., Geol. Soc. of London, London, sess. 1941-42, Nos. 1381-1388, 1942, pp. 58-59.

Magnetic exploration was begun in England by the Geological Survey in 1928. Several typical examples are described: Swynnerton Dykes, Blairgowrie Dykes, and Brockhill Dykes in Shropshire; Melton Mowbray and Mount Sorrel; Furness and Cumberland; and Whin Sill on the southern slope of Mickle Fell. Laboratory determinations and methods of interpretation are discussed briefly. A bibliographical list is appended. - V.S.

7270. Howe, H. H. On Spontaneous Increase of Magnetic Moments. Nat. Research Council, Am. Geophys. Union, Trans. of 1943, pt. I, Washington, D. C., 1943, pp. 222-226.

Magnets are known gradually to loose their strength, but instances have been observed when magnetic moments increased with time. For example, in 1940 the Cooke magnetometer used at the Tucson Observatory has shown an increase of nearly one-half percent in magnetic moment during the preceding 18 months. The author and J. H. Nelson indepently plotted the log M_{20} and the temperature against the time. (The moment,

is here corrected for temperature by adding 0.00008 to log M for each ree that the temperature exceeds 20° C.; this value is designated as 0). The resulting curves showed that the increase in moment occurs ing the summer but not during the winter. Nelson also observed that he temperature and the "adjusted" log M_{20} be regarded as sine curves, y are approximately 90° out of phase. Analayzing this observation, the hor concludes that the rate of change of log M_{20} is a linear function of nperature. As a physical explanation, he offers three suggestions. nong them is his hypotheses that the rate of increase depends on the ternal mean temperature and the temperature range. - V. S.

71. Jones, W. M. Magnetic Disturbances on the Canterbury Plains. New Zealand Jour. of Sci. and Technol.; B. General Section; Wellington, N. Z.; vol. 23, No. 3-b, 1941, pp. 73b-83b.

Variations of vertical magnetic intensity over a range of 750 gammas re found on the Canterbury Plains to the west of Christchurch, notably the Wigram and Burnham districts. West of Burnham, variations up 45' in declination also were detected. The exposed basalts of the ttelton volcano produce disturbances of at least 11,000 gammas in the rtical intensity and 30° in declination, and parts of the disturbances on e plains are attributed to the extension underground of the Lyttelton lcanics. - Author's abs.

72. Knapp, D. G., and Howe, H. H. Magnetic Observatory Results at Honolulu, Hawaii, for 1931-32 and 1933-34. U. S. Coast and Geodetic Survey, Washington, D. C., MO-11, 1942, 119 pp., and MO-14, 1943, 114 pp.

These publications contain extensive tables of observatory results, productions of magnetograms showing the more important magnetic orms, and an explanatory text. The tabulated results include hourly ean values of the magnetic elements D, H, and Z, summaries of their onthly and annual means, collected mean diurnal variations for each onth, season, and year, lists of principal magnetic disturbances, amounts non-cyclic change, observed and adopted base-line values of the D, H, d Z variometers with their abrupt changes, etc. The text includes a scription of instruments, discussions of their coefficients and behavior d of the procedures used, and explanations of the various tables. - uthors' abstract.

7273. Northern Miner. Metalore Resumes Drilling on Magnetometer Results. Toronto, vol. 29, No. 37, 1943, p. 14.

A magnetometer survey was conducted by the Metalore Mining Corporation, Canada, on its property in the end of 1943. Iron sulfide had been discovered in this area, and a search was made for copper. The survey covered two areas adjoining Normetal Metals. Magnetic anomalies were found in four places. These will be drilled during the winter 1943-44. - V. S.

7274. Rieseberg, H. E. A New Gold Locating Device. The Min. Jour., Phoenix, Ariz., vol. 27, No. 13, 1943, p. 5.

The author describes R. Krahmann's magnetic balance. This instrument was originally devised for locating small shallow mineral deposits, but it also proved useful in detecting gold beds. Through its operation, new discoveries were made in the Main Reef of the Rand goldfields, South Africa, and in the Yellow-Knife area of the Great Slave Lake territory, Northern Canada. The instrument detects the magnetic gold-bearing rocks underground and, apparently, under water. A magnet in the apparatus dips gradually as it approaches the area in which a magnetic ore rests, until it comes over the center of the ore mass. The movement is infinitesimal, but it is magnified by a mirror fixed to the magnet, so that it may be read on a scale. A drawing illustrates the apparatus. Two operators are required for the use of the magnetic balance. The field procedure is briefly outlined. - V. S.

7275. Rigal, Remigio. El Yacimiento de Magnetita de Hierro Indio y Otros Menores del Departamento San Rafael, Provincia de Mendoza (Magnetite Deposits of Hierro Indio and Other Minor Mines of the Department of San Rafael, Province of Mendoza). Direccion de Minas y Geologia, Boletin 52, Buenos Aires, 1942, pp. 9-11.

A brief account is included of magnetometric investigations of magnetite in Argentina. Magnetite deposits were first explored by S. Waessman in about 1925; he worked in the La Carreta mountains, Catamarca Province. R. Rigal made more recent studies in the Hierro Indio mines region. The magnetometer of Thalen-Tiberg, modified by Dahlblom, was used. Magnetic maps were prepared of vertical intensities in the areas surveyed. - V. S.

6. Swainson, O. W. Magnetic Work of the United States Coast and Geodetic Survey from April 1942 through March 1943. Nat. Research Council, Am. Geophys. Union, Trans. 1943, pt. I, Washington, D. C., 1943, pp. 226-229.

The U. S. Coast and Geodetic Survey devoted most of its work during past year to gathering, processing, and compiling information useful the conduct of the war. The principal activities were as follows: (1) gnetic surveys: a new isogonic and isoporic chart of the Caribbean Sea a has been prepared; the work in the American Republics was continued; the United States, observations were made in the extreme western and thwestern States. (2) Office work: magnetic data were furnished to arly every mapping service in the Government; observations at ob- rvatories, magnetic tables and charts, and directions for testing compass ses were prepared for publication. (3) Instrumental work: a modifica- n of a special Z-type magnetometer for supplanting the earth-inductor in preparation; magnetograph recorders equipped with gold ribbon have en constructed. (4) Observatories: the five magnetic observatories of Survey - Cheltenham, Honolulu, San Juan, Sitka, and Tucson - continued operation without interruption. - V. S.

3. SEISMIC METHODS

77. Ayres, L. G. Ups and Downs in Seismograph Field Operations. Mines Magazine, Denver, Colo., vol. 33, No. 10, 1943, pp. 535-537.

The author briefly describes the technique of seismograph field erations on a solid terrain and in the exceptionally difficult conditions the Louisiana swamp country. - V. S.

78. Blake, Archie. The Non-Invariantive Character of the Iso-p Surface as an Iso-P Surface in the Statistical Interpretation of Geophysical Data (Abs.). Nat. Research Council, Am. Geophys. Union, Trans. of 1943, pt. I, Washington, D. C., 1943, p. 60.

The writer objects to establishing in geophysical research a class "significant" observations in which the prior probability does not pear. In the present paper he states one of the objections to this method; s criticism is mathematical. The inverse probability of an observation a three-dimensional space is designated as "p." The problem is to fine a surface that shall divide the points of this space into two sub- asses - the significant and the insignificant. A part of the definition the surface is that the integral of "p" over the significant points shall

have a prescribed value "P;" accordingly, the surface is called an "iso-P surface." This condition is not sufficient for determining the surface. Such difficulty often is obviated by the method of "fiducial probability" defining the iso-P surface as coinciding with an iso-p surface that cuts off the desired integral P. However, this method does not meet the requirement of invariance; the iso-p surface may assume very different shapes not coinciding with the transforms of the iso-P surface initially defined in terms of them. The requirement of invariance is better satisfied by the method of inverse probability based on the formula of Bayes for the probability of a hypothesis after an observation. This formula is discussed briefly. The explicit treatment of prior probability gained by this latter method has the advantage that its results do not depend on the choice of statistics and in this sense are not predetermined. - V. S.

7279. Bodle, R. R. Additional Evidence for High-Speed Surface Waves over Atlantic Paths. Nat. Research Council, Am. Geophys. Union, Trans. of 1943, pt. I, Washington, D. C. 1943, pp. 57-59.

High-speed surface waves have been observed over Pacific paths. Bermuda's records of earthquakes on November 10, and 28, 1942, show high-speed surface waves likewise over Atlantic paths. The rate of travel in these records is very near the upper limit for transverse surface waves, 4.67 km/sec. In support of the Bermuda evidence, the writer presents a table, "Summary of data on earthquakes involving high-speed surface waves over Atlantic Ocean." This table indicates that high-velocity surface waves are observed over the Atlantic paths, which are largely land routes. It also shows that these waves may be missing on some Atlantic paths; however, the latter evidence is weak. - V. S.

7280. Bravinder, K. M. Los Angeles Basin Earthquake of October 21, 1941, and Its Effect on Certain Producing Wells in Dominguez Field, Los Angeles County, California. Bull. Amer. Assoc. Petrol. Geologists, Tulsa, Okla., vol. 26, No. 3, 1942, pp. 388-399.

An earthquake occurred on October 21, 1941, in the Los Angeles Basin. Its epicenter was in the Newport-Inglewood zone, about 3 miles southeast of the Dominguez oil field. This shock damaged the casing in 15 flowing wells in the field, so that a 1 1/2-inch dummy pressure bomb could not pass through the inside of the 2 1/2-inch tubing. In 6 wells, significally, the bore was found to intersect the plane of a south-dipping reverse fault close to the point of damage. The author concludes that the total evidence indicates a growth of the comparatively young Dominguez structure, probably as a result of continued lateral movement along the

wport-Inglewood line of sheer. In this process, areas of unrelieved ess are continually being formed. Some such stress was relieved by earthquake of October 21, 1941. This relief and the resulting damage the wells must have occurred by means of a movement along the above- dicated reverse fault. - V. S.

81. Bullen, K. E. The Ellipticities of Surfaces of Equal Density in the Earth's Interior. Tans. and Proc., Royal Soc. of New Zealand, Wellington, vol. 72, pt. 2, 1942, pp. 141-143.

In previous works, the author discussed ellipticities of surfaces of ual density within the earth's interior. Figures for these ellipticities re based on the earth's density variation. Since then there have been provements to travel timetables of seismic waves that have affected nsity values. In the present paper, the author analyses the consequent terations in ellipticity figures. The new figures are presented in a ble; they are found to be very close to the previous figures, the maxi- um change in the outer mantle of the earth being 0.00002. The effect ellipticity corrections to the travel times of seismic waves is found be negligible. It will be greatest with PKP for a ray that has passed rough the earth's center. But even there, it should not exceed 0.1 econd. This deviation is within the limits of precision of the ellipticity bles. It is therefore unnecessary to modify at all any of the previously blished ellipticity corrections to the travel time of earthquake waves. he paper is accompanied by a bibliography of the author's previous orks on ellipticity. - V. S.

282. California Institute of Technology. Cooperative Researches at the Seismological Laboratory. Carnegie Inst. of Washington Year Book No. 41, 1941-42, Washington, D. C., 1942, pp. 102-106.

The Seismological Laboratory at Pasadena, Calif., in 1941-42 tudied the region of southern California in respect to local earthquakes, hickness and nature of mountain-formation, quantitative relations between he magnitude, intensity, and acceleration of earthquakes, earthquakes nd structure, differences in travel times, propagation of sound waves, tc. The conclusions of some of the papers are outlined; attention is iven to the work of B. Gutenberg and of C. F. Richter. Several earth- uakes in southern California are listed. The local stations have been in ontinuous operation during the year; the precision of their data and of he data of cooperating stations in the Southwest has improved. A "Chroni- al Conspectus of Seismologic Stations" has been published by H. O. Wood; contains information on more than 800 stations in different parts of the orld. A part of the time of the personnel has been devoted to war roblems. - V. S.

7283. Cappelletti, M. S. El Sismógrafo Argentino Construído en los Talleres de Mecánica de Precision de la Dirección de Meteorología, Geofísica e Hidrología (The Argentine Seismograph Constructed in the Mechanical Precision Shops of the Department of Meteorology, Geophysics, and Hydrology). Proc., Eighth Am. Sci. Cong., 1940, Washington, D. C., vol. 7, Physical and Chemical Sciences, 1942, pp. 67-69.

The Department of Meteorology, Geophysics, and Hydrology, Argentine Ministry of National Agriculture, has constructed a horizontal-component seismograph of the Mainka type. A detailed description of the instrument is given, illustrated by two photographs. - V. S.

7284. Dake, H. C. The Core of the Earth. The Mineralogist Magazine, Portland, Oreg., vol. 11, No. 8, 1943, pp. 244-245, 252-254.

A general discussion of the core of the earth is concluded with a brief summary: "(1) The central core has a diameter of some 4,000 miles. Its composition is essentially iron 90% and nickel 7%, with a specific gravity of around 10.00, the discrepancy over normal iron being charged to pressure. (2) Next comes a layer of magnesium iron silicate, about 1,000 miles thick and of intermediate density. (3) Next is a layer of peridotite rocks about 1,000 miles thick, with a specific gravity of close to 4.00. (4) Finally, the outer crust, with a specific gravity of from 2.75 to close to 4.00, and of varying composition and nature. (5) The inner metallic core comprises about 75% of the total weight of the earth. (6) The increasing density of the earth dampens and impedes the free passage of seismic waves. Hence, earthquake vibrations do not pass directly through the core, but tend to follow along the lighter outer crust. (7) The relatively vast deposits of iron minerals found in the crust of the earth represent less than 5% of the total amount of iron assumed to be present in the earth." - V. S.

Eby, J. B. Geophysical History of the Iowa Field, Calcasieu and Jefferson Davis Parishes, Louisiana. Geophysics, Menasha, Wis., vol. 8, No. 4, 1943, pp. 348-355 (see Geophys. Abs. 7256).

7285. Finch, R. H. The Seismic Prelude to the 1942 Eruption of Mauna Loa. Bull. Seismol. Soc. Am., Berkeley, Calif., vol. 33, No. 4, 1943, pp. 237-241.

The author describes the activities that preceded Mauna Loa's eruption of 1942 and foreshadowed its occurrence: (1) Summit activity

1940, ordinarily followed by flank eruptions in about 2 years; (2) the igration of epicenters of earthquakes along the NE-SW rift beginning ebruary 8, 1942; (3) a swarm of earthquakes along the northeastern ft on February 21; (4) a large number of shakes in February and March;) large fluctuations of the E-W tilt in March, indicating that molten lava as approaching the surface; and (6) short-lived activity at the summit on pril 26, usually preceding a flank eruption by 2 to 3 days. The flank ruption started on the northeast rift on April 28, 1942. (For a descrip- on of the eruption, see Geophys. Abs. 113, No. 6915.) - V. S.

286. Gamburtsev, G. A. Instruments for Seismic Prospecting and Methods of Improvement (abs.). Internat. Geol. Cong., 17th sess., U.S.S.R., 1937, Abstracts of Papers, Moscow, 1937, pp. 189-190.

Mechanical and electromechanical oscillating mechanisms are iscussed with a view to perfecting seismic instruments. The author evelopes a theory of linear oscillating systems with many degrees of reedom. This theory is based on a formulation of the conditions to be atisfied by bi-polar mechanical elements, and a consequent representa- ion of mechanical systems by closed contour lines. Linear algebraic nd differential equations are evolved for the sum of relative velocities f elements belonging to a mechanical contour and for the equilibrium f forces about the key points of the contour. Such equations are given or static and dynamic conditions of mechanical systems. This theory s applied to problems of the filter seismograph, recording of refracted nd reflected waves, etc. The idea is suggested of a bi-polar mass, which in one of its variants is a kind of double pendulum. - V. S.

7287. Germain-Jones, D. T. Seismic Refraction Technique (abs.). Proc., Geol. Soc. of London, Session 1941-1942, London, Nos. 1381-1388, 1942, pp. 59-60.

Refraction surveys have been made in southwestern Iran. At first, anticlinal folds were located in the Asmari limestone by observations of ine traverses, but this approach proved slow and ineffective. Better progress was made with the discovery of the arc-method. Subsequent refraction work located an Asmari anticline on the southwestern side of the salt- and gypsum-bearing Lower Fars series, beneath an adjoining surface syncline. This Asmari anticline was not predictable by ordinary geological methods owing to the discordant relationship of the overlying Lower Fars. The surface indications had lead geologists to place this anticline beneath the Lower Fars proper, rather than on the side of it, at a depth not exceeding 3,000 feet. - V. S.

7288. Gutengerg, Beno. Seismological Evidence for Roots of Mountains. Bull. Geol. Soc. Am., Washington, D. C., vol. 54, No. 4. 1943, pp. 473-498.

Theoretical problems concerned with the calculation of the velocities of seismic waves in the various layers of the earth's crust and the determination of the thickness of such layers are discussed. The results are applied to seismograms obtained from artificial explosions, and sources of error in interpretation are investigated. Seismograms registered in different parts of the earth from epicenters less than 1,000 km. from stations are used to investigate the layering in these regions and the problem of mountain roots. The bearing of the findings on the theory of isostasy is discussed. - Author's abs.

7289. Heck, N. H. The Role of the Western Hemisphere in Seismology Under Present-day Conditions. Proc., Eighth Am. Sci. Cong., 1940, Washington, D. C., vol. 7, Physical and Chemical Sciences, 1942, pp. 57-62.

Seismological research has been restricted by the war to the western hemisphere. Fortunately, the Americas provide the greatest opportunities in this field. (1) The portion of the earthquake belt surrounding the Pacific has 20,000 km. of its extent in the Americas. In addition, there are minor belts in eastern North American with a length of 4,700 km. and some submarine belts within the range of American stations. (2) The western hemisphere possesses altogether 94 seismograph stations; the instruments are of many kinds and were standard at the time of their installation. It is true, only California and New England are wholly provided for local earthquakes; more stations are particularly desirable south of the equator. (3) The earthquakes in the Americas are numerous and range over all grades of intensity. A recent report on El Salvador lists, on one occasion, 28 earthquakes in 10 days; very great earthquakes occurred at New Madrid, Miss., 1811, and Charleston, S. C., 1886. (4) The earthquakes of the western hemisphere offer a great variety of problems; the author briefly describes some of them and enumerates others. - V. S.

7290. Hercules Powder Co. Seismograph Dynamite. Mines Magazine, Denver, Colo., vol. 32, No. 11, 1942, p. 607.

The Explosives Department of the Hercules Powder Co. has developed a new cartridge of seismograph dynamite known as "Spiralok." The dynamite is packed in a strong paper shell equipped with a spiral

read. This cartridge has a standard length. In loading, a stout spiral-ooved sleeve is screwed over the external halves of two adjacent cart-dges until they butt together. A series of joined cartridges provides a mplete seismograph-shot charge. It forms a strong, rigid column and akes unnecessary the stringing, lathing, taping, and pegging commonly sed in loading a hole. - V. S.

291. Kornfeld, J. A. Peace Creek Field - a Stratigraphic Trap. World Petroleum, New York, vol. 14, No. 13, 1943, pp. 38-47.

The Central Kansas Uplift may become a proving ground of pros-ecting techniques for the discovery of stratigraphic traps because this rea is easily explored. As an example, the author describes exploration n the Peace Creek district on the southeastern flank of the uplift, where important oil fields and 2 gas fields have been developed from strati-raphic reservoirs. Reflection seismograph surveys provided the initial ndications for the drilling tests. A number of tests were drilled beyond ne area's productive limits, before the Snowbarger well showed oil. The mmediate basis of the discovery was subsurface geologic mapping guided y reflection seismograph data. Other discoveries followed. The Peace reek stratigraphy and structure are described and illustrated by maps. he principal controlling factor in oil-accumulation seems to be the resence of porosity and permeability in the producing limestone ormation. - V. S.

292. Landowners Royalties Co. Does the Seismograph Work? Montana Oil and Min. Jour., Great Falls, Mont., vol. 23, No. 31, 1943, p. 4.

Oil discovery by seismograph crews in northern Montana included he following: (1) Stanolind Co. found a structure in Pondera County at resent producing at the Midway oil field. (2) Heiland Research Co. dis-overed in the Midway district a still higher structure; the Wood well is earby, and the largest producing well, Hageman-Pond-Rispin No. 1, is bout 40 feet lower. In Pendroy's vicinity is situated the Emrick fault; il has been found on both sides of it. The Jarvis and Taylor-Goggins well s drilled on the high side of this fault near a Madison contace "high." 3) Shell Oil Co. found the Willow Creek structure, Teton County, on the ast face of the Rocky Mountains. (4) Texas Co. ran a profile across the orthern Sweetgrass Arch and another profile in Pondera County; the atter profile has spotted in the Midway area the Schlepp No. 1 and the Texaco-Kiel wells. (5) General Petroleum Co. has worked on the western lank of the Sweetgrass Arch, Teton County, but the results are not yet nown. - V. S.

7293. Legge, J. A., Jr., and Rupnik, J. J. Least Squares Determination of the Velocity Function $V = V_o + kz$ for Any Set of Time-Depth Data. Geophysics, Menasha, Wis., vol. 8, No. 4, 1943, pp. 356-361.

A method is presented by means of which a least square fit of the circular ray path plotting function to time-depth data is obtained. An example is worked out illustrating the application of the method to an actual case. - Author's abs.

7294. Lynch, W. A., and Dillon, Vincent. The Deep-Focus Earthquake of May 19, 1940, in the Sea of Okhotsk. Bull. Seismol. Soc. Am., Berkeley, Calif., vol. 33, No. 4, 1943, pp. 251-267.

The writers have studied the earthquake of May 19, 1940, in the Sea of Okhotsk. Their material consisted of original seismograms from 28 stations and reports from 78 other stations. The epicenter was located at geocentric latitude 49°50′ ± 7′ N; longitude 148°58′ ± 10′ E. The origin time has been determined by the method of Sohon, as modified by Gutenberg and Richter; the data are tabulated. The depth of focus was calculated for the interval pP - P; the table of Gutenberg and Richter was used, and the data are cited. Intervals sS-S gave a depth of the same order of magnitude, but large deviations occurred. Travel curves were drawn for the phases P, PcP, pP, S, ScS, sS; the arrival times and phases are tabulated. - V. S.

7295. Mei, A. I. The Amplitude Ratio, PP/P, as Recorded by Galitzin Seismographs. Bull. Seismological Soc. of Am., Berkeley, Calif., vol. 33, No. 3, 1943, pp. 149-195.

A method was sought for distinguishing between Pacific and continental seismic reflections. For this purpose, a study was made of the ratio of the amplitude of the longitudinal wave reflected at the surface of the earth to that of the direct wave, as recorded by Galitzin seismographs. At the start, it was theoretically assumed that equal energy is radiated in all directions from the source. For empirical evidence, the records of 194 earthquakes were analyzed. The computations showed that the amplitudes of waves recorded on Galitzin instruments do not afford a means of distinguishing between reflections at a layered surface (continent) and an unlayered surface (Pacific). A control comparison of the records of the vertical Benioff and the Galitzin seismographs showed no appreciable difference. The results were not limited, however, to these negative findings. Two stations using Galitzin seismographs were found to be situated at the same distances from eight Mexican epicenters and were receiving

pulses over the same kind of continental path. Their PP/P ratios re-
aled that energy is not sent out equally in all directions from the source,
assumed, and that the mechanism at the focus plays an important part
these ratios. - V. S.

96. Neumann, Frank. Progress-Report on Seismological Activities of the United States Coast and Geodetic Survey, April 1, 1942, to March 31, 1943. National Research Council, Am. Geophys. Union, Trans. of 1943, pt. I, Washington, D. C., 1943, pp. 88-91.

This report covers the following seismological activities of the
S. Coast and Geodetic Survey: (1) Teleseismic work: about 25 sta-
ons cooperating with the Survey continued in operation; in the United
ates, five stations installed Benioff three-component seismographs.
) Earthquake-information service: no earthquakes of outstanding im-
rtance were reported from the Pacific Coast and Western Mountain
ates; moderate shocks occurred in New England and on Lake Erie.
) Strong-motion work: the 53 strong-motion stations of the Survey and
operating agencies continued in operation. (4) Vibration work: on the
est coast, observations were made of buildings, blasting operations, and
eavy machine vibrations, in part in connection with defense projects.
) Miscellaneous seismological information from the U. S. A., Ecuador,
enezuela, Colombia, Bolivia, Perú, Chile, etc. - V. S.

297. Ricker, Norman. Further Developments in the Wavelet Theory of Seismogram Structure. Bull., Seismological Soc. of Am., Berkeley, Calif., vol. 33, No. 3, 1943, pp. 197-228.

In this paper, the wavelet theory of seismogram structure pre-
iously proposed by the author (see Geophys. Abs. 104, No. 5929) has been
xtended to obtain the form of the seismic disturbance (due to a sharp
eismic pulse) at various distances from the source. The solution of
tokes's differential equation is given in the form of a series of wavelet
inctions, and calculated seismograms are presented to show the manner
n which the shape, breadth, and amplitude of the disturbance vary with
he distance from the source. Tables are given of the wavelet functions
nd wavelet-form functions used in the calculations. - Author's abs.

298. Science News Letter. Earthquake Waves Clocked. Washington, D. C., vol. 43, No. 18, 1943, p. 286.

The St. Georges, Bermuda, seismograph station has measured the
elocity of earthquake waves moving over the bottom of the Atlantic

(see Geophys. Abs. 7279). Such measurements were made in Norway also. The results showed that the velocity averaged about 4.5 km/sec. - V. S.

7299. Ulrich, F. P. Progress Report of Seismological Work by the United States Coast and Geodetic Survey in the Western United States during 1942. Bull. Seismol. Soc. Am., Berkeley, Calif., vol. 33, No. 4, 1943, pp. 281-293.

The seismological report of the U. S. Coast and Geodetic Survey for the western United States for 1942 covers the following activities: (1) Collection of earthquake information: earthquake activity was found to be below normal; 12 principal shocks are described; the number of cooperative reporters has increased by 5,000; etc. (2) Sensitive-seismograph work: 11 sensitive-seismograph stations were operated in the Rocky Mountain and Pacific Coast States, cooperatively or independently; the list is included. (3) Strong-motion work: measurements of accelerations of gravity have been completed; 43 accelerographs, 6 displacement meters, and 11 Weed strong-motion seismographs were operated cooperatively or independentently. (4) Tiltmeter work: 3 tiltmeters at Berkeley and 1 tiltmeter at Long Beach were operated; tiltgrams are reproduced in the text. (5) Vibration work: observations on buildings and on the ground, as well as observations of machinery, were made. (6) Instrumental changes: insensitive attachments have been installed; instrumental periods changed in southern California; shaking-table tests were completed. (7) Washington Office: Earthquake History of the United States, 1940, has been published; processing of part of the records of teleseismic stations and double integration of accelerograms were advanced. - V. S.

7300. Weiss, Oscar. The Causes of Rockbursts. South African Min. and Eng. Jour., Johannesburg, vol. 53, pt. 2, No. 2592, 1942, pp. 103-107.

Rockburst is defined as a sudden failure of rocks surrounding mine excavations. The author considers the cause of rockburst as being primarily a release from confining pressures. In rocks, the stresses are not uniformly distributed, as hydrostatic pressures, and produce permanent deformations. Some distributions of stress generate gradual accumulations and sudden releases, resulting in rockbursts. Other distributions generate only tremors. On the Kolar goldfield, some 13,000 tremors were recorded by seismographs in 1 year, but the number of rockbursts was only 0.6 percent. The condition of rock material is then not the only cause of rockbursts, as is often supposed. The most important factors

e the confining pressures of the surroundings and the resulting distri-
tion of the differential pressures acting on the rock mass. The author's
periments show that a fracturing of rocks will occur, not where the
essure is the highest, but where the release from confining pressures
the greatest and most sudden. (A review of this paper appears in the
ining Magazine, London, vol. 67, No. 6, 1942, pp. 337-340). - V. S.

4. ELECTRICAL METHODS

01. Cohee, G. V. Use of Electrical Logs in Subsurface Studies in Indiana. Proc., Indiana Acad. of Sci., 1942, Notre Dame, Ind., vol. 52, 1943, pp. 163-165.

In an electric log, two types of diagrams can be obtained - a record self-potential generated naturally in a drill hole, and a record of resis-
vity showing the difference in potential at two electrodes from an electri-
l current conducted into the ground. Self-potential is the result of
ectrofiltration and electro-osmosis; electrical resistivity varies with
e physical nature and water content of rocks. These phenomena are
scussed briefly. The electric log of a well thus characterizes the litho-
gy of the formations, the fluid content of the strata, and the porosity of
yers. It gives a measurement of the depth to various key horizons of
bsurface formations; coal horizons can be determined and correlated.
pproximately 500 oil and gas test wells have been electrologged in
diana; examples of logs are presented, and their local problems are
dicated. Application of electrical logging to water wells is planned in
linois and Missouri. - V. S.

302. Dickey, P. A. Natural Potentials in Sedimentary Rocks. Am. Inst. of Min. and Met. Eng., New York, Tech. Pub. 1625, 1943, 10 pp.

Potential differences between strata of shale and sandstone have
een recognized for about 15 years, and they form the basis of the electri-
al logging of oil wells. Hitherto, these potentials have been ascribed
olely to electrochemical reactions caused by the disturbing effects of the
ater in the drill hole through which they are generally measured. Ob-
ervations by the author in wells empty of water and in a mine shaft
uggest that potential differences between sandstones and shales are
atural and specific properties of the rocks, although they are modified
n measurement by the disturbing effects of the water in the drill hole.
he cause of these potentials probably is to be sought in the relative
olar adsorptive capacities of quartz and clay particles. - Author's abs.

7303. Hagan, W. W. Electrical Earth Resistivity Surveys. Proc., Indiana Acad. of Sci. for 1942, Notre Dame, Ind., vol. 52, 1943, pp. 166-168.

An electrical earth-resistivity survey determines air average apparent resistivity to various depths at different stations. Four electrodes are placed on the ground in a straight line at equal distances. Then, a commuted current is conducted into and through the ground between the two outer electrodes, and the voltage drop is measured between the two inner electrodes. The depth to which each reading is taken is determined empirically by the separation of two adjacent electrodes. The formula for the determination of the average apparent resistivity of the entire thickness of material between the inner electrodes is: $\rho = 2 \pi a V/I$, where ρ equals the apparent resistivity, "a" the distance between adjacent electrodes, "V" the voltage drop or potential between the inner two electrodes, and "I" the true current through the ground. The instrument and procedure are described. The Illinois State Geological Survey has used this method for locating ground water in sand and gravel. The Indiana Division of Geology, Department of Conservation, likewise proposes to use this method for locating ground water. - V. S.

7304. Hawley, P. F. Fault Location by Electrical Prospecting - An Example. Geophysics, Menasha, Wis., vol. 8, No. 4, 1943, pp. 391-403.

Electrical resistivity surveys were run in an area near Campbell, Hunt County, Tex., across a known fault of the Mexia system. Lateral inhomogeneity of earth resistivity was investigated by employing constant-depth surveys, using the Wenner configuration with 1,000-foot spacing between adjacent electrodes. Five depth surveys were made using the Wenner configuration at electrode spacings up to 4,000 feet. These depth surveys were interpreted by using 3-layer curves interpolated from the Wetzel-McMurry data. The interpretations checked reasonably well against resistivity logs in two 350-foot core holes in the region. The constant-depth profiles cannot be said to have definitely indicated the presence of the fault, but a thin high-resistance bed participating in the faulting was clearly delineated by the depth surveys and could be used to locate the fault. - Author's abs.

7305. Hefley, D. G., and Fitzgerald, P. E. Selective Acidizing and Permeability Determination by an Electrical Method. Am. Inst. of Min. and Met. Eng., Tech. Pub. 1604, New York, 1943.

An apparatus has been developed that permits selective acidizing of producing formations and determination of the relative permeability of a formation by fluid injection. This apparatus, known as the "electric pilot," is an electrical fluid-interface locator, the electrical circuit of which is completed when the electrodes in the well are in contact with a conductive fluid but is not completed when immersed in a nonconductive fluid. Results are given for a number of typical acidizing applications in which the interface locator was used to control the acid. Description of the method used in making a permeability survey and the data obtained also are included. - Author's abs.

7306. Jarvis, W. L. Standardization of Electrical-Log Headings. Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 27, 1943, pp. 238-242; also, California Oil World, Los Angeles, Calif., vol. 36, No. 23, 1943, pp. 5-8.

The API California District Subcommittee on Core Analysis and Electrical Logging has developed a standardized heading for electrical logs that alters and amplifies existing forms. Such a heading is desirable to make descriptions uniform and to facilitate interpretations. It was widely circulated for suggestions among oil men and represents a broad consensus of the California industry. The number of the entries is limited to an essential minimum compatible with a full utilization of information. The author presents the new standardized form and discusses its entries with respect to purpose, use, and terminology. - V. S.

7307. Koenigsberger, I. G. Surface Geology and Determination of the Center and Surface Depth of a Disturbing Body, or Plane, by Geophysical Methods Following the Potential Theory (in Russian). Internat. Geol. Cong., Rept. of the 17th sess., Moscow-Leningrad, 1937, vol. 4, Moscow, 1940, pp. 463-484.

Geologic problems of tectonics and magmatic intrusions can be approached by two kinds of geophysical methods - those based on the theory of the potential and those using waves. The potential theory provides for the problem of the center and surface depth of a disturbing body, three basic rules that are outlines. - V. S.

7308. Roach, C. B. Subsurface Study of Jennings Field, Acadia Parish, Louisiana. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 27, No. 8, 1943, pp. 1102-1122.

Jennings field is one of the major producing centers on the Louisiana Gulf Coast. It is on a piercement-type salt plug surmounted by a thick cap rock. A geological study was made of its stratigraphy, structure, sand mineralization, and petroleum accumulation. Electric logs served as the main basis of the investigation. Only a few logs of the shallow supercap wells were available, but electrical surveys were made of almost all flank wells. Unfortunately, these surveys were rarely performed before cementing the surface casing at approximately 1,500 to 1,700 feet. - V. S.

5. RADIOACTIVE METHODS

7309. Alder, R. L. Recompletions Based on Radioactivity Logs. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 9, No. 3, 1943, pp. 10-12.

The neutron and the gamma-ray curves are widely used to locate the limits of productive zones before gun perforating. The two curves are made separately, but both may be run with surface equipment similar to the Electrolog units. In California, almost every major field used radioactivity logs. The Los Angeles Basin has started many work-over jobs on the basis of radioactivity logs; in the Long Beach field, one company followed radioactivity logs with plug-back and gun-perforating programs. The Huntington Beach and Santa Fe fields have used radioactivity logs in stratigraphic studies. The San Joaquin Valley requires preferably a combination of both the neutron and gamma ray logs. A tested procedure of radioactivity logging in the case of recompletion is described. The paper is illustrated by samples of logs. - V. S.

7310. Dobrotin, N. A., and Frank, I. M. Radiation Receiver with Reduced Sensitivity to the Position of the Source. Compt. Rend. (Doklady) de l'Acad. Sci. de l'U.R.S.S., Moscow, vol. 39, No. 2, 1943, pp. 49-52.

The measurement of radiation within a solid angle offers special difficulties. Such is the case when nonpoint sources are compared, or when the position of the source in space cannot be fixed exactly. The precision of measurements often depends here on the accuracy with which the position of the radiating source is known with reference to the receiver. A solution would be to have a chamber in which the current would depend on the intensity of the radiating source but not on its position. A. Piccard and L. Meylan suggested a flat chamber large enough to cover the radiation of the source over an angle of nearly 2π. This apparatus is described and criticised in several respects. A different

pparatus is proposed by the authors. If an absorbing screen is placed etween the source and the receiver, then with a change of distance be- ween source and receiver the solid angle subtended by the receiver at he source and the solid angle formed by the cone of the shadow will hange at a different rate. At a certain distance, these changes may ompensate each other. This principle is discussed in several respects; articularly for the case when a small ionization chamber is switched pposite the main chamber, instead of the absorbing screen. - V. S.

7311. Hughes, J. D. Radioactivity Logging Provides Valuable Data for Gulf Coast Operations. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 9, No. 4, 1943, pp. 4-9, 34.

Radioactivity logging is used to obtain subsurface data in new wells nd to provide information for remedial work in old wells. There are lso particular uses in specific situations. Some of them are described: (1) Uses in new wells: Measurements when drill pipe and electrical log are in disagreement; location of subsurface markers in sections not in- dicated by electrical logs; porosity and density measurements by gamma ray and neutron curves in areas of consolidated sedimentation; clarifi- cation of uncertain anomalies indicated by electrical logs; data for deepen- ing operations; accurate logs of cased-off formations for recompletion; neutron curves of casing seats in relation to producing horizons; con- tinuous logs for correlation with other wells; correlations for structural studies; elevations where original zero of electrical log is lost; clarifi- cation of electrical logs when discrepancy is found either at bottom or up the hole; etc. (2) Location of porous streaks: In areas where production is obtained from porous horizons, as in limestone sections in west Texas, the neutron curve in combination with the gamma-ray curve have been quite successful in identifying such horizons. (3) Special Applications of Radioactivity Logging: Carnotite studies in squeeze cementing; radio- active material in drilling fluids for permeability studies; accurate log when fluid conditions will not permit electrolog; accurate log of formation after casing when no electrical log was made. Some of the problems are illustrated by examples of logs. - V. S.

7312. Keevil, Norman B. Radiogenic Heat in Rocks. The Journ. of Geol., Chicago, vol. 51, No. 5, 1943, pp. 287-300.

Results of hundreds of new radioactivity determinations on rocks and minerals plotted on frequency-distribution curves lead to lower pro- bable rates of heat production than were estimated previously. This may be due in part to unrepresentative sampling, and the need for more

abundant data is emphasized. For this purpose analyses for radium alone are not satisfactory. A rapid means of obtaining the rate of heat production from a single measurement of the rate of emission of α-rays, developed in 1939, is described and applied. Owing to similarity in the rates of α-ray emission and in the rates of production of heat of the thorium and uranium series at their normal abundance ratios in rocks, the rate of heat production from disintegrations in these series may be calculated by means of the single equation, $H^1 = 2.15a$ calories per gram per million years (Th/UI assumed to be 3.5, and "a" the observed rate of α-ray emission in alphas per milligram per hour). It also appears to be satisfactory to assume that the percentage of K_2O equals 2.5a, so that the total heat production, H, equals 2.25a cal/gm/My. - Author's abs.

7313. Keston, A. S. Stable Self-quenching Geiger-Müller Counters Containing Organo-Metallic Compounds. Rev. of Sci. Inst., Lancaster, Pa., vol. 14, No. 10, 1943, pp. 293-295.

Stable self-quenching Geiger-Müller counters may be prepared by filling counter tubes with tetramethyl lead vapor alone at about 2 cm. pressure. These counters are characterized by very wide, usable voltage ranges, high resolving power, long plateaus, and good sensitivity. Wide voltage ranges are found where the count is virtually independent of the voltage applied to the tube. A selfquenching property is likewise shown to a high degree by mercury dimethyl, and for a short time by iron carbonyl. - V. S.

7314. Kurbatov, L. M. The Radioactivity of Ferro-Manganese Beds and the Determination of the Rate of their Formation by the Radioactive Method (in Russian). Internat. Geol. Cong., Rept. of the 17th sess., Moscow-Leningrad, 1937, vol. 4, Moscow, 1940, pp. 513-522.

Studies of ferromanganese beds in the seas and lakes of the U.S.S.R., chiefly Karskoe Sea, showed the presence of radioactivity. Apparently, radioactive elements migrate in the earth's crust and accumulate in sedimentary rocks. An analysis of samples from the Karskoe Sea indicated that the radium content varies in different localities and decreases with the depth of samples. The decrease from surface downward may be ascribed to radium disintegration with time. If the rate of disintegration is known, the age of formations can be determined. Calculations showed that this age must be estimated in thousands of years. - V. S.

7315. Mounce, W. D., and Rust, W. M., Jr. Natural Potentials in Well Logging. Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1626, 1943, 6 pp.

An abstract of this paper has appeared in the Oil Weekly, Houston, Tex., vol. 109, No. 10, 1943, pp. 56-57 (see Geoph. Abs. 114, No. 7057. - V. S.

6. GEOTHERMAL METHODS

7316. Van Orstrand, C. E. Flow of Heat from an Intrusive Body into Country Rock. Am. Inst. Min. and Met. Eng., Tech. Pub. 1677, New York, 1944, 9 pp.

Metalliferous deposition in intrusive rocks is investigated in its dependence on heat conduction. An intrusive is defined as a mass of igneous rock that has migrated upward into country rock from great depth. The problem is treated in terms of integral calculus. Theoretical equations are derived for the flow of heat from the intrusive into the rock, and numerical calculations are made for particular data. The results are embodied in two tables - (1) values for percentages of the initial differences in temperature between the intrusive and the country rock, and (2) values derived from above percentages for the construction of an isothermal surface. These results show rapid changes of gradient in a relatively thin outer zone of the intrusive. Significantly, rapid cooling must produce a highly fractured zone. The obtained findings lead to the conclusion that the spreading of isotherms is a favorable condition for the deposition of metals (as far as increased tendency toward fracturing is itself a favorable condition); this condition prevails in the cupolas and in the outer shell of the intrusive beyond the "dead line." The concentration of isotherms beneath the troughs of the intrusive is a much less favorable condition for the deposition of metals. - V. S.

7. GEOCHEMICAL METHODS

7317. Pirson, S. J. Two-Year Summary of Geodynamic Prospecting Results. The Oil Weekly, Houston, Tex., vol. 110, No. 9, 1943, pp. 23-30.

An abstract of this paper was given in Geophysical Abstracts 114, No. 7068. The following figures can now be added. A total of more than 2,500 stations has been made during the past two years. They represent over 70 independent surveys performed in 14 different States of the United

States and Canada. The results are embodied in a table "Geodynamic Exploratory Wells" covering prospecting up to July 1943. These results give the average success of geodynamic exploratory drilling as 1/3. A well is deemed a success when it discovers oil or gas in quantities producible commercially. - V. S.

7318. Trask, P. D., and Patnode, H. W. Source Beds of Petroleum. Am. Assoc. of Petrol. Geol., Tulsa, Okla., 1942, 566 pp., 72 figs. Price, $4.50.

The object of this investigation was to find means of recognizing source beds of petroleum. Twelve properties of sediments were studied: Texture, organic content, carbon content, chromic acid reduction, nitrogen content, color, assay number, relative volatility, nitrogen-reduction ratio, oxidation, carbon-nitrogen ratio, and calcium carbonate content. The nitrogen-reduction ratio was found to have a fairly definite relationship to the occurrence of oil; namely, it is generally low in sediments associated with oil zones and high in barren beds. This ratio is of value for prospecting in virgin territory and for extending the limits of known production areas. Volatility and the carbon-nitrogen ratio are also related to the presence of oil but offer less promise in prospecting. Organic content and color of sediments, often regarded as good prospecting indications, were found not to be related to the occurrence of oil. - V. S.

7319. West, S. S. The Analysis of Gases by Scattering of Electrons. Geophysics, Menasha, Wis., vol. 8, No. 4, 1943, pp. 404-418.

Methods are described for the analysis of mixtures of hydrocarbon gases by measurement of the probability of scattering of electrons as a function of energy of impinging electron, angle of scattering, or loss of energy during collision. By such means, one can determine carbon-hydrogen ratio, proportions of single and multiple carbon-carbon bonds, and concentrations of gases in a mixture. - Author's abs.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

7320. Blau, L. W. Progress Recorded in Gravitational, Seismic, and Geochemical Methods and in Well Logging. Min. and Met., New York, vol. 25, No. 446, 1944, pp. 118-119.

Research in geophysical methods was reduced during 1943 by the demands of the war; still, some progress was achieved. (1) Gravimetry:

Plastics have been substituted for strategic metals in the construction of instruments. The averaging of closures in prospecting can now be made by means of electric networks. At the University of Texas, Austin, sudden changes of deflection have been observed in the records of the local gravity meter; more stations are desirable for a closer study. (2) Seismology: Existing amplifiers have been changed so as to "peak" more sharply; opinions differ as to desirable sharpness. Progress has been reported in the seismic localization of faults. Seismic velocities have been found to vary significantly over distances of only a few miles; accordingly, the mapping of reflection times tends now to supplant the translation of reflection times to depth on the basis of depth curves. (3) Geochemistry: Two oil fields have been discovered in Texas exclusively by means of the geochemical method. One of them is especially interesting because previous core drilling had not indicated favorable structure. (4) Well-logging: A spontaneous-potential dip-meter has become available; it determines the dip of the strata penetrated by a borehole. Placing permanent markers in boreholes is gaining wider acceptance. Gamma-ray and neutron logging are gradually being adopted by the industry. - V. S.

7321. Bruckshaw, J. M. Some Factors Limiting Geophysical Prospecting. Abs. of Proc., Geol. Soc. of London, London, sess. 1941-42, Nos. 1381-1388, 1942, pp. 57-58.

The factors limiting the usefulness of geophysical methods are examined. (1) The gravitational and magnetic methods require that structures possess vertical relief. Even then, a number of different bodies may produce similar effects at the surface and make interpretation difficult. (2) The gravimeter determines total gravity values varying with the inverse square of the depth, whereas the Eötvös torsion balance measures values changing inversely as the cube of the depth. Hence, the large deep-seated structures should be investigated by gravity meters, whereas, the shallow bodies must be explored by torsion balances. Thus, in balance work the topography is the limiting factor; in gravimetric work, it is the instrumental capacity. (3) The seismic and electrical methods suffer from background effects, which must be separated from the influence of the structure. Moreover, in highly faulted areas and in regions of steep dip, the reflection method is at a disadvantage. (4) The electrical method requires the use of alternating current, which impairs penetration into formations, especially in areas of low resistivity. - V. S.

7322. Bugbee, J. M. Reservoir Analysis and Geologic Structure. Trans., Am. Inst. Min. and Met. Eng., New York, vol. 151, Petroleum Development and Technology, Petroleum Div., 1943, pp. 99-111.

Geophysics can be useful in employing a water drive as a reservoir production mechanism. As faulting on the domes and in the synclines influences water influx, considerations of geologic structure are essential for predicting reservoir performance. All such information as delineation from cores, electrical logs, exploitation data, the study of synclines, the dynamics of formation, etc., should be utilized in determining the geologic configuration. - V. S.

7323. Heiland, C. A. Annual Review: Geophysics. Min. and Met., New York, vol. 25, No. 446, 1944, pp. 61-65.

This review of geophysics during 1943 covers oil exploration, strategic minerals exploration, engineering geophysics, regional geophysical investigations, and manpower and materials situation: (1) OIL EXPLORATION was active, but the pools discovered were small. (a) The monthly average of geophysical parties in the field was about 340; seismic operations led with 75 percent, gravimetric operations were 21 1/2 percent, and other methods made about 3 1/2 percent. Miscellaneous methods showed a slight but steady increase. The gravimeter work decreased slightly from 1941 to 1942 but picked up materially in 1943. The total number of well-logging operations was better than 12,000 in 1941, dropped to about 9,000 in 1942, but is expected to total 11,000 in 1943. (b) The Southern and Southeastern States claimed about 60 percent of activity; Mid-continent States and Western States, about 13 and 12 percent, respectively; the Eastern States and California, 7 and 8 percent, respectively. (c) The annual geophysical outlay was better than $31,500,000, which is only about 12 1/2 percent of the total exploration effort of the industry estimated by A. I. Levorsen at $250,000,000 annually. (d) Geophysics discovered an increasing number of fields each year between 1926 and 1942; the total is approximately 790 for the entire United States, or 9 1/2 billion barrels. In 1942, geophysical methods yielded half of the reserves found by all methods. (e) The average discovery dropped from 46 million barrels in 1931 to 2 1/2 million in 1942. The means of improving the discovery rate are the devising of new geophysical methods, expansion of exploratory activities, extension of surveying to relatively unexplored regions, and, above all, application of present methods to the geologic factors responsible for the origin of oil but as yet eluding detection. (2) STRATEGIC MINERALS EXPLORATION: Marked improvement took place in respect to aluminum, copper, and zinc. Geophysical prospecting was done for aluminum. The gravimeter served again in surveying for zinc in the Tri-State district. The Duluth gabbro-slate contact was located more accurately by means of the Hotchkiss Superdip. Chromite was prospected with a magnetometer on the Oregon coast. Resistivity and magnetometer surveys were made in the Ochoco quicksilver area. Magnetometric

prospecting served for searching nickel-cobalt in the Fredericktown area, Missouri. Magnetometric surveys located tungsten in California. In Canada, many new uses have been found for geophysics, according to H. Lundberg. At Steep Rock Lake in Ontario, a magnetometric survey made on the ice of the lake assisted in outlining the hematite ore body. In Fairbanks, Alaska, magnetometric work on scheelite deposits has been continued. In Mysore, India, a graphite body was discovered under a negative self-potential center. (3) ENGINEERING GEOPHYSICS: The Mississippi River Commission issued two reports on the application of seismic refraction and electrical resistivity to flood control. The first report dealt with depth determinations of Tertiary beds on levee sites of Mississippi; the second report described refraction shooting on proposed dam sites in the Ozark highlands. At Stanford University, shaking-table tests were conducted to assist in the work on the Kentucky Dam. (4) REGIONAL GEOPHYSICAL INVESTIGATIONS: The Missouri Geological Survey completed gravimeter and magnetometer surveys of the State. The Geological Society of America published the transcontinental gravimetric and magnetic work of G. P. Woolard. Gravimetric and magnetic surveys also were made by Woolard in New Jersey. (5) MANPOWER AND MATERIALS SITUATION: At the end of 1943, the geophysical industry employed an estimated total of 6,000 individuals, including professional, subprofessional, semiskilled, and unskilled men and women. In 1942, the geophysical industry lost about 33 percent of its personnel to the armed forces and 44 percent to other industries and government agencies, so that hired replacements represent a turnover of some 77 percent. Priorities on metal stocks are adequate. But construction of new equipment has been behind schedule owing to lack of certain parts. - V. S.

7324. Jones, O. T. The Relation of Geophysics to Geology. Abs. of Proc., Geol. Soc. of London, London, sess. 1941-42, Nos. 1381-1388, 1942, pp. 56-57.

The author approaches geophysics primarily as a weapon of geological surveying. He outlines the electrical, magnetic, gravitational, and seismic methods and discusses their application to a number of geological problems. The electrical resistivity methods have been used in exploring for underground waters, buried channels, the depth of overburden on solid rocks, etc. The seismic methods can be employed in determining the depth of relatively unconsolidated sediments overlying the older rocks, the rock floor of sediments in lakes, estuaries, and shallow seas, as well as in mapping bands of hard rock beneath glacial drift, etc. However, such cooperation between geology and geophysics must not be onesided. Reciprocally, geophysics should take advantage of available geological information in interpreting its findings. - V. S.

7325. Kimio, Uemura. Contributions to Geophysical Prospecting Recently Employed in Japan (Abs.). Internal. Geol. Cong., 17th sess., U.S.S.R., 1937; Abstracts of Papers, Moscow, 1937, p. 186.

A list of geophysical work conducted by the writer since 1922 for the Geological Survey of Japan: (1) Radio seismograph surveying at the Kashiwazaki oil field to detect the structure of the oil-bearing Tertiary formation. (2) Electrical surveying of cupriferous pyrite deposits in crystalline schists, of contact metamorphic copper deposits, and of metasomatic ore deposits; the methods included resistivity, potential drop ratio, self-potential, and induction. (3) Resistivity surveying of oil at a depth of less than 150 m. in the Yabase oil field, Akita district. Some minor geophysical work is likewise mentioned. - V. S.

7326. Kovner, S. S. Progress of Soviet Geophysics During 25 Years. Bull. Acad. Sci. U.R.S.S. (Izvestiia), Série Géographique et Géophysique, Moscow, No. 1, 1943, pp. 3-28.

This review deals with geophysical methods of prospecting used in the U.S.S.R. during the last 25 years - seismic, gravitational, magnetic, electric, geothermal, radioactive, gas-survey, etc. The author draws the conclusion that the main difficulty in interpreting the results of all the methods is the possibility of several different solutions. Thus, the question "Where to drill?" can be answered only by a many-sided examination of all the various results obtained by geophysical exploration. Appended to the review are lists of scientific organizations and journals connected with geophysical work. - W. A.

7327. Lambert, W. D. The Distance Between Two Widely Separated Points on the Surface of the Earth. Jour., Washington Acad. of Sci., Menasha, Wis., vol. 32, No. 5, 1942, pp. 125-130.

The distance between two widely separated points on the surface of the earth is discussed for the case of a slightly flatened ellipsoid of revolution, the connecting line becomes here a geodesic. The two points on the earth are given by their latitudes and longitudes; they are assumed to be intervisible. In such an instance, the lines actually observed by a surveyor are two plane sections of the surface; each plane section has its characteristic property for only one of its points - the point where the plane contains the normal to the surface. The problem thus qualified is treated in terms of spherical trigonometry. Different values are used for the latitude in deriving the formulas. In 5 formulas the parametric, or reduced, latitude is taken; in 5 others, the geographic latitude; and in 2 formulas, a number of successive approximations necessary to obtain the

accuracy of seven-place tables. The results of the formulas are compared by means of numerical examples. Numerical results are also given for the properties of a minimum geodesic between two points on the earth's equator; they are computed for a flattening of the earth, f = 1/300 a = 20,000 km. - V. S.

7328. Lundberg, Hans. A Plea for Lowering the Brows of the Geophysicists. Min. and Met., New York, vol. 24, No. 444, 1943, p. 560.

In commenting on the report of the Geophysics Education Committee (see Geophys. Abs. 115, No. 7195), the author advocates a curriculum closely adapted to exploration geophysics. He agrees with C. A. Heiland that the program recommended by the Committee would prepare geophysical scientists rather than practical prospectors. A detailed theoretical knowledge is not necessary, he finds, for handling instruments; yet, it handicaps understanding and cooperation between geophysicists and the practical miners and geologists. - V. S.

7329. Petroleum. Education and Petroleum Industry. London, vol. 6, No. 6, 1943, pp. 81-82.

V. C. Illing gave figures on the relative participation of petroleum technologists and chemists in the Journal of the Institute of Petroleum, London. Although the membership of both groups in the Institute is about equal, the articles on chemical subjects in recent years have greatly outnumbered those on geology, geophysics, and related subjects. - V. S.

7330. Turechek, G. F. Gun-Perforating Performances Improved by New Bullet Design. California Oil World and Petroleum Industry, Los Angeles, vol. 36, No. 18, 1943, pp. 9-11; also, Mines Magazine, Denver, Colo., vol. 33, No. 10, 1943, pp. 522-524; also, Tomorrow's Tools - Today, Los Angeles, Calif., vol. 9, No. 3, 1943, pp. 4-7.

The Lane-Wells Co. has developed a new bullet for gun-perforators. This bullet has a conically shaped, ogival head, which provides several advantages: a strong point, a center of gravity moved forward to insure straight flight, a point so proportioned as to give nearly constant displacement of the metal being pierced, a bullet whose length-to-weight ratio is more favorable, and a hole in the casing characterized by a well-rounded, smooth burr. The new design results in greater penetration and better all-around performance. - V. S.

7331. Uren, L. C. Recent Developments in Formation Logging; Part 2 (Concluded). The Petrol. Eng., Dallas, Tex., vol. 14, No. 6, 1943, pp. 84-88.

Part 1 of this paper was reviewed in Abs. 113, No. 6958. Part 2 deals with temperature logging and inspection of drilling fluid. (1) Temperature surveys can be made inside of casing. A knowledge of changes in the temperature gradient assists in determining the positions of water, oil sands, gas-oil contacts, variations in permeability, casing leaks, etc. Thermometers used for surveys are of three types: (a) The maximum mercury thermometer, (b) the self-contained, continuously recording type lowered into a well, and (c) the continuously recording type in which one element is lowered into the well and another element takes records on the surface. These thermometers are described. (2) Logging by inspection of drilling fluid is being offered by Baroid Sales, National Lead Co. It determines depth, thickness, composition, and fluid content of formations. Most data are automatically recorded as the well is drilled. The intricate equipment is mounted in a trailer. It includes a drilling-rate recorder, volumetric meter of circulating fluid, depth-recorder, sclerograph, pump-cycle counter, gas detector, ultra-violet light detector of oil in the drilling fluid, electrical detector of salt water, etc. Operation is controlled by continuous tests of the drilling fluid and of the rate of penetration of the drill. An illustration shows the logs obtained. - V. S.

7332. Van Tuyl, F. M., et al. Some Significant Developments in 1942 in Petroleum Geology and Geophysics. Mines Magazine, Denver, Colo., vol. 33, No. 10, 1943, pp. 517-520, 548.

This article comprises extracts from the introductory statement to the "Review of Petroleum Geology in 1942" by the same authors (see Geophys. Abs. 115, No. 7220). The extracts are prefaced by an announcement on the inauguration of annual reviews by the Research Committee of the American Association of Petroleum Geologists. - V. S.

9. NEW PUBLICATIONS

7333. Carnegie Institution of Washington. Year Book No. 40, July 1, 1940-June 30, 1941, Washington, D. C., 1941, 346 pp.

The geophysical work of the Carnegie Institution during the year 1940-41 is reviewed in two sections of the year book. (1) Geophysical Laboratory, report by L. H. Adams, director: Experiments were concerned with fusion relations in silicate mixtures (anhydrous), systems

with water under pressure, properties of solutions under high pressure, stability relations of copper-iron sulfides, sulfidelike compounds, crystal structure by X-ray analysis, radium content of ocean-bottom sediments, effect of pressure upon the Curie temperature, petrofabric analysis, gravity measurements, and volcanology. There were also activities connected with the war. A summary of published work accompanies the report. (2) Department of Terrestrial Magnetism, report by J. A. Fleming, director, and O. H. Gish, assistant director: The Department carried on investigations of the permanent magnetic field, cosmic relations, magnetic disturbances, upper atmosphere, atmospheric electricity, ionosphere, atomic physics and magnetism, as well as instrumental work, field work, observatory work, reduction of the "Carnegie" data, and miscellaneous activities. Considerable time was devoted to war work. - V. S.

7334. Coast and Geodetic Survey, U. S. Department of Commerce. Prog. Rept. on Strong-Motion Earthquake Work, October, November, December, 1943, MSP-47, Washington, D. C., 1943, 8 pp.

The following work is described: (1) San Francisco Office, questionnaire program; (2) strong-motion work, with summary of seismograph data; (3) vibration work; (4) principal earthquakes; (5) Lake Mead project; (6) Shasta Dam and Grand Coulee projects; and (7) Washington office. - V. S.

7335. Mayer, A. W. Chemical-Technical Dictionary (German-English-French-Russian). Chemical Publishing Co., Inc., Brooklyn, N. Y., 1942, 872 pp. Price, $8.

The present volume is the first American edition of A. W. Mayer's German dictionary "Chemisches Fachwörterbuch, Deutsch-Englisch-Französisch," to which Russian equivalents have been added under the direction of Professors B. N. Menshutkin and M. A. Bloch. - V. S.

7336. Newhouse, W. H., Ed. Ore Deposits as Related to Structural Features; Prepared Under the Direction of the Committee on Processes of Ore Deposition of the Division of Geology and Geography of the National Research Council. Princeton University Press, Princeton, N. J., 1942, 280 pp. 248 figs. Price, $6.50.

This volume seeks to correlate the facts of geologic structure and ore occurrence. Some 60 writers contribute descriptions of the world's most representative ore districts. The descriptions are grouped under the following headings: (1) Structural features associated with ore

deposits of certain types and in large areas; (2) Ore deposits in massive rocks; (3) Ore deposits in layered rocks; and (4) Ore deposits near contact of massive and layered rocks; a chapter, "Structural petrology applied to ore deposits" was written by H. W. Fairbairn. The descriptive material is introduced by a chapter composed of papers by W. H. Newhouse, B. S. Butler, and T. S. Lovering. This introduction gives the general organization, geological principles, and conclusions of the total work. Newhouse discusses, in particular, fault relations and the occurrence of ore deposits at contacts of dissimilar rocks. - R.T.C., Jour. of Geol., Chicago, vol. 51, No. 7, 1943, pp. 501-502, condensed by V. S. (Reviewed by W.G.F., Geol. Mag., vol. 80, No. 5, 1943, pp. 196-206).

7337. Oxford University Observatory. The International Seismological Summary: July-December, 1934, Oxford, 1941-42, 329 pp.

This semiannual summary has been prepared and edited by J. S. Hughes and E. F. Bellamy. It consists of two quarterly issues: (1) July-September, 1934, pp. 327-514, published in 1941, and (2) October-December, 1934, pp. 515-656, published in 1942. The same authors also have prepared an Index to the International Seismological Summary for 1934. - V. S.

7338. Schuchert, Charles. Stratigraphy of the Eastern and Central United States. John Wiley and Sons, Inc., New York, 1943, 1,013 pp., 4 pls., 123 figs. Price, $15.

This book is the second volume of three in the series "Historical Geology of North America." Together the three volumes are designed to document an "Atlas of American Paleography," to be issued as a part of the third volume. The present volume is mostly concerned with the geology of separate States. An outline is given of regional physiography and structure. There follows a highly condensed description of the various formations and their members, lithology, thickness, and faunal contents. The text is comprehensively documented with bibliography. The book is almost an encyclopedia of stratigraphy. - H. E. Vokes, Science, vol. 98, No. 2535, 1943, pp. 110-111; condensed by V. S.

7339. Sineriz, J. G. La Interpretacion Geologica de las Mediciones Geofisicas Aplicadas a la Prospeccion (The Geological Interpretation of Geophysical Measurements Applied in Prospecting), vol. 2, 676 pp. Memorias del Instituto Geologico y Minero de Espana, Madrid, 1941.

The second volume of this publication (for volume 1 see Geophys. Abs. 58, No. 1782) contains descriptions of the following geophysical surveys in Spain: (1) Seismic and gravimetric investigations in Navarre and Huesca for potassium; (2) seismic investigation in Valencia for saline beds; (3) seismic investigation in the Straits of Gibraltar with a view to a submarine tunnel; (4) seismic and gravimetric investigations in Leon for hydrological information; (5) seismic investigation in El Pardo (Madrid) for geologic information; (6) seismic and electrical investigations in Las Rozas (Madrid) for hydrological information; and (7) electrical investigation in Hiendelaencina of the "Rico" mineral deposit. The descriptions of the investigations contain a general statement, geographical and geological information, geophysical work, and a summary. Concrete observations are cited and maps are presented. A geophysical bibliography is appended. - V. S.

10. PATENTS

7340. Method for the Geochemical Prospection of Hydrocarbon Deposits; Sylvain J. G. Pirson, State College, Pa., assignor to Geochemical Service Corporation, a corporation of Oklahoma. U. S. Patent 2,324,107, issued July 13, 1943.

A method for detecting the presence of hydrocarbon deposits in the earth, comprising drilling a hole into the surface geological strata at a plurality of locations over an area to be explored, withdrawing from each hole a plurality of samples at different depths, at least one sample being collected at each of the different depths, selecting from the respective holes samples having substantially the same degree of acidity, and quantitatively analyzing the samples so selected for leakage products characteristically associated with the presence of the hydrocarbon deposits sought for, whereby the leakage products determined in each sample may be correlated with the sample location in the area being prospected to provide data from which the location of the hydrocarbon deposits can be determined. - Claims allowed, 5.

7341. Seismic Surveying: W. T. Born, Tulsa, Okla., assignor to Geophysical Research Corporation, New York, N. Y., a corporation of New Jersey. U. S. Patent 2,324,816, issued July 20, 1943.

Apparatus for seismic surveying comprising means for converting seismic waves into electrical waves, a variable response recorder for said electrical waves, and means actuated by the arrival of seismic waves at said converting means for increasing the recorder response. - Claims allowed, 16.

7342. Gravity Meter; D. H. Clewell, Dallas, Tex., assignor to Socony-Vacuum Oil Co., New York, N. Y., a corporation of New York. U. S. Patent 2,325,005, issued July 20, 1943.

A horizontal, pivoted beam-type gravity meter in which the gravity responsive element has a weight and volume distribution such that changes in gravity moments therein due to changes in elevation will be compensated by changes in buoyancy moments therein due to the same changes in elevation. - Claims allowed, 8.

7343. Means for Obtaining Soil Samples; Herbert Hoover, Jr., Sierra Madre, and H. E. Metcalf, San Francisco, Calif., assignors to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California. U. S. Patent 2,325,057, issued July 27, 1943.

Apparatus for collecting a soil sample without substantially disturbing the contents thereof, which comprises a body member having an aperture for admitting a substantially rigid preformed soil column, a container holder secured to said body, alined with the axis of said aperture, and adapted to position a container around a free end of said soil column, guides supported by said body member transverse to said axis, cutting means transversely movable in said guides and adapted to sever a portion of said soil from the end of said soil column, said portion being of such size as to fit into said container readily. - Claims allowed, 7.

7344. Seismographic Prospecting; A. C. Winterhalter, Beaumont, Tex., assignor to Sun Oil Co., Philadelphia, Pa., a corporation of New Jersey. U. S. Patent 2,325,157, issued July 27, 1943.

In combination, a firing circuit for an explosive charge, current supplying means for said circuit, signal-transmitting means comprising a thermionic vacuum tube having a grid, and means for controlling the transmitting means to transmit a signal upon disruption of the firing circuit by explosion of a charge, which simultaneously causes an electrical change in the firing circuit; said last named means comprising an electronic tube of relay type and connections between the last mentioned tube and the firing circuit, whereby it is arranged to discharge upon the disruption of the firing circuit, and connections through which such discharge changes the bias on said grid. - Claims allowed, 5.

7345. Method and Apparatus for Seismic Exploration; J. P. Woods, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,325,199, issued July 27, 1943.

For use in combination with a seismic recorder and an insulated cable electrically connected to said recorder, a seismic detector comprising an arcuate magnet member, an armature member adapted to bridge the magnet member, resilient means adapted to support one of said members with regard to the other end to maintain a variable nonmagnetic gap therebetween, one of said members being adapted to be laid in contact with the ground subject to the vibrations thereof, the other member being supported by said resilient means as an inertia element with regard to the vibratory member, the coil of said detector being formed of an integral part of said insulated cable inserted within the magnetic circuit comprising said members. - Claims allowed, 9.

7346. Gun Perforator; A. J. Zschokke, Huntington Park, Calif., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware. U. S. Patent 2,326,114, issued August 10, 1943.

A gun perforator comprising a gun body having radially directed, axially displaced gun bores, a cartridge chamber having an axially extending cartridge-receiving portion intersecting at least one of said gun bores; other cartridge chambers, each having laterally disposed cartridge-receiving portions for the other of said gun bores, said cartridge-receiving portions defining, with their respective gun bores, planes normal to the axis of the gun body; and ignition passages connecting said cartridge bores. - Claims allowed, 8.

7347. Seismic Circuit; W. H. Mayne, San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,326,153, issued August 10, 1943.

The combination, with an electric seismometer, of a blasting circuit, said circuit comprising a source of direct current and the bridge wire of a blasting cap connected in series, a recording galvanometer connected to said seismometer, means associating said blasting circuit and said galvanometer so constructed and arranged that signal voltages induced in the blasting circuit at the time of "break" of the bridge wire may be so modified that they are transmitted to the galvanometer, said means including a thermionic amplifier for the signal voltages, a filter having a high capacity in the output of said amplifier, and means to limit the rate of discharge of said capacity through said wire in the event of a short circuit in said amplifier whereby it will not be heated to cap-exploding temperature. - Claims allowed, 9.

7348. Apparatus for Determining the Dip in the Earth's Substrata. R. F. Davis, Washington, D. C., assignor to Well Surveys, Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,326,640, issued August 10, 1943.

A device for determining the nature of subsurface formations that comprises an electrode adapted to be lowered into an opening in the earth, means to measure the depth to which said electrode is lowered, a source of power having one terminal connected to said electrode, a Y resistance to the center of which the other pole of said power source is connected, surface power electrodes connected to the opposite ends of said Y resistance and adapted to be located in the surface of the earth and in a generally symmetrical arrangement around the mouth of the bore hole, a measuring electrode positioned in the vicinity of each of said surface power electrodes, a Y inductance connecting said measuring electrodes and arranged so that the arms of said inductances are in substantially the same position relative to each other as are the surface power electrodes, and means for indicating the direction of the resulting magnetic field around said inductances. - Claims allowed, 4.

7349. Blasting Machine; R. N. Stoddard, East Orange, N. J., assignor to Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., a corporation of Pennsylvania. U. S. Patent 2,326,696, issued August 10, 1943.

The method of firing a plurality of electric blasting caps which comprises generating an alternating current, rectifying the current, accumulating and storing the rectified current of less than firing value, preventing discharge at less than firing value, automatically discharging the stored current upon attaining firing value into a firing line, and supplying firing current to the plurality of blasting caps simultaneously. - Claims allowed, 4.

7350. Perforating Gun for Oil Well Casings. L. E. Couch, Houston, Tex., assignor to Well Tool Development Corporation, a corporation of Texas. U. S. Patent 2,327,340, issued August 24, 1943.

A casing-perforating gun comprising a stock adapted for lowering in the casing, a plurality of gun barrels transversely in the stock having firing communication with each other, a projectile mounted in each barrel having a firing charge adapted to propel the projectile through the wall of the casing, mechanical firing means for the charge, a movable safety member for the firing means, and means actuated by a predetermined

liding movement of the stock in the casing to control actuation of the firing neans on the down movement of the stock and to move said safety member nto and out of safety position as required. - Claims allowed, 68.

351. Improvement in Well Tools. J. S. McDonald and W. E. A. Ruska, Houston, Tex., assignors to Well Tool Development Corporation, a corporation of Texas. U. S. Patent 2,327,362, issued August 24, 1943.

A perforating gun for well casings comprising a stock having a cham-er, an explosive charge therein, a projectile mounted in the stock to be projected by the explosion of the charge, firing means for the charge, safety means for preventing effective operation of the firing means, means or locking said safety means in active position to allow positioning of the run at a selected depth in the well irrespective of movements of the gun required for said positioning process, said locking means being adapted o be positively unlocked at the will of an operator at the ground surface o allow the charge to be fired. - Claims allowed, 73.

7352. Apparatus for Gas Analysis; E. D. McAlister, Montgomery County, Md., assignor to Standard Oil Development Company, a corporation of Delaware. U. S. Patent 2,327,539, issued August 24, 1943.

Apparatus for gas analysis comprising a source of radiation; an absorption cell for containing a sample of gas, said cell being provided with a plurality of slits covered with windows so placed that radiations entering the cell through one slit pass out through another slit; a plurality of mirrors of selective reflecting material placed so that they will reflect radiations from said source of radiation through the cell, each mirror being constructed of a material which selectively reflects a relatively narrow band of radiations in the infra-red range, and which is selectively absorbed by a gas whose presence is suspected in the sample of gas; and a means for determining the quantity of radiation falling upon it, placed to receive the radiations passing through said cell. - Claims allowed, 4.

7353. Method and Apparatus for Measuring Porosity of Solids. W. L. Horner, Dallas, Tex., assignor to Core Laboratories, Dallas, Tex., a corporation of Delaware. U. S. Patent 2,327,642, issued August 24, 1943.

In the art of measuring, in a porous body, the space filled with gas, the method comprising determining the volume of a sample of the body by immersing it in liquid, forcing the liquid under pressure into the pores

of said body to compress the gas in said pores and to occupy the space occupied by the gas, and measuring the liquid while under pressure necessary thus to supplant the gas. - Claims allowed, 13.

7354. Gravity Meter. L. L. Antes, Houston, Tex., assignor to Standard Oil Development Company, a corporation of Delaware. U. S. Patent 2,327,692, issued August 24, 1943.

A gravity meter comprising a lever suspended intermediate its ends by a pair of oppositely disposed, horizontally alined torsion springs, a mass secured to one end of said lever arm, a laterally extending bimetallic strip carried by the other end of said lever arm, and a compensating mass slidingly mounted on said bimetallic strip. - Claims allowed, 2.

7355. Gravity Meter. F. G. Boucher, Tulsa, Okla., assignor to Standard Oil Development Company, a corporation of Delaware. U. S. Patent 2,327,697, issued August 24, 1943.

A gravity meter, comprising a moving system, including a horizontally arranged body having a mass extending horizontally from one side thereof, torsional means normally holding said mass and said body in a horizontal position, means for applying a force to said mass through the center of gravity of said body, and means for resisting the effect of said force on said body arranged in the same horizontal plane as the force applying means. - Claims allowed, 3.

7356. Geophone; M. D. McCarty, Dallas, Tex., assignor to Socony-Vacuum Oil Company, New York, a corporation of New York. U. S. Patent 2,328,222, issued August 31, 1943.

In an instrument adapted to detect seismic waves by generating electrical signals corresponding to them of the type that utilizes alternating flux paths that are distinct from the source of direct flux, the improvement that comprises low reluctance conductors comprising links connecting like poles of permanent magnets for producing direct flux, said links consisting of high-permeability metal filings and a plastic material surrounding said filings and bonding them together into the desired shape. - Claims allowed, 9

7357. Gun Perforator; G. F. Turechek, Los Angeles, Calif., assignor to Lane-Wells Company, Los Angeles, Calif., a corporation of Delaware. U. S. Patent 2,328,308, issued August 31, 1943.

A gun perforator comprising means defining a cartridge chamber and gun bore; a bullet for said gun bore exposed to the hydrostatic pressure of liquids in which the gun perforator is immersed and adapted to be urged by said hydrostatic pressure backwardly into said cartridge chamber; an explosive cartridge in said cartridge chamber adapted to be compressed by rearward movement of said bullet, said cartridge chamber being larger than said gun bore; and a flange on the inner end of said bullet within said cartridge chamber. - Claims allowed, 7.

7358. Firing Head for Gun Perforators; G. F. Turechek and Lloyd Spencer, Los Angeles, Calif., assignors to Lane-Wells Company, Los Angeles, Calif., a corporation of Delaware. U. S. Patent 2,328,309, issued August 31, 1943.

A firing head for explosively operated well tools comprising a body member; an explosive cartridge supported therein; a firing pin positioned to strike said cartridge; a stem adapted to engage said firing pin, said stem having a laterally flexible portion; and means engageable with said flexible portion to move the end of said stem adjacent said firing pin clear thereof. - Claims allowed, 8.

7359. Well Logging Method; Herbert Hoover, Jr., Sierra Madre, Calif., assignor to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California. U. S. Patent 2,328,555, issued September 7, 1943.

In a well-drilling operation, the improvement that comprises locating a gas-oil contact in a petroleum-bearing zone by determining the increments of light hydrocarbons and the increments of heavy hydrocarbons in a series of portions of the mud column circulated past the bottom of the well, said portions being substantially undiluted by infiltration of fluids from said zone but containing cuttings corresponding to successive bottom points in said zone at known depths in the well, some of said points being above and some below the gas-oil contact, and determining the depth in said zone at which the increment of heavy hydrocarbons increases rapidly as compared with the increment of the light hydrocarbons. - Claims allowed, 2.

7360. Fluid Well Perforator; P. T. Bynum, Beeville, Tex. U. S. Patent 2,328,782, issued September 7, 1943.

A fluid well-perforator including a cylinder, a cylinder head closing the cylinder at its upper end, a stem slidable through the cylinder head,

a plunder head on the stem within the cylinder, a perforator knife in the cylinder, and fluid-operated means between the perforator knife and the plunger head and operable upon downward movement of the stem for projecting the perforator knife to perforate a casing wall, said fluid-operated means including an enclosed operating cylinder fixed to the first-mentioned cylinder and a plunger in the operating cylinder, said plunger being connected with the stem. - Claims allowed, 24.

7361. Automatic Volume Control; S. A. Scherbatskoy, Tulsa, Okla., assignor to Engineering Laboratories, Inc., Tulsa, Okla., a corporation of Oklahoma. U. S. Patent 2,329,558, issued September 14, 1943.

In an automatic volume-control system (for seismograph amplifiers) a nonlinear resistance in series with a condenser connected across the signal channel, another nonlinear resistance in series with another condenser across the said signal channel in opposition to said first resistance and condenser, and means for applying a control voltage across the nonlinear resistances according to the volume of the signal. - Claims allowed, 1.

7362. Device for Regulating the Sensitivity of Signal Receiving Apparatus; Robert Wellenstein, Werner Holle, and Martin Schumacher, Bremen, Germany; vested in the Alien Property Custodian. U. S. Patent 2,329,570, issued September 14, 1943.

In a signal-receiving apparatus, means amplifying impulse signals anddisturbance waves, grid-control means for said amplifier, means providing a negative biasing voltage varying in amplitude with the magnitude of the amplified signal impulses and disturbance waves, means applying said biasing voltage to said grid-control means, and means delaying the transmission of the grid-control means of each biasing impulse produced by signal impulse so that each biasing impulse does not affect the amplification of said amplifier during the reception of the corresponding signal impulse, the feature for accomplishing this result being the interdependency of the biasing circuits and the inclusion therein of devices having opposed elements arranged to increase or decrease the grid bias of the amplifier in response to variations in the magnitude of the disturbance waves and the time period of the signal impulses. - Claims allowed, 4.

7363. Geophysical Exploration System; Herbert Hoover, Jr., Sierra Madre, C. G. Morgan, Pasadena, and N. J. Christie, Whittier, Calif.,

assignors to Consolidated Engineering Corporation, Los Angeles, Calif., a corporation of California. U. S. Patent 2,329,721, issued September 21, 1943.

In seismic prospecting involving generation of a first set of seismic waves in the earth at a shot point, the reception of this set of waves at a series of reception points in the earth spaced horizontally from each other and from the shot point, the generation of a second and later set of waves at a shot point in the earth, and the reception of this second set of waves at a series of reception points in the earth spaced from each other and from the shot point at which said waves are generated, the arrangement of shot point and reception points for the first set of waves being at least in part different from the arrangement of the shot point and reception points for the second set of waves, the improvement that comprises receiving both sets of waves at reception points spaced from both shot points, receiving in the first set a first plurality of waves after said waves have been reflected from one portion of a reflecting horizon in the earth, receiving in the second set a second plurality of waves after these have been reflected from a different portion of the reflecting horizon, and receiving in the first and second sets at least one reference wave reflected from substantially the same point on the reflecting horizon, said reference waves having travel paths from the generation point to reception point of substantially the same length. - Claims allowed, 9.

7364. Method of Determining Suitable Areas for Oil Exploration; J. G. Campbell, Houston, Tex., assignor to R. H. Fash, Fort Worth, Tex. U. S. Patent 2,329,824, issued September 21, 1943.

The method in the exploration for oil to localize the areas to be more intensively explored, which consists in analyzing measured samples of water taken from streams, springs, or wells in said areas by subjecting each measured sample to ultraviolet light, determining the content of the oil contained in the body of the liquid sample by measuring the intensity of the resulting fluorescent effect and then selecting the favorable areas on the basis of the data thus obtained. - Claims allowed, 3.

7365. Geochemical Prospecting; M. A. Arthur, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,330,021 issued September 21, 1943.

A method for prospecting for subterranean petroliferous deposits, which comprises collecting samples of soil at spaced points in an area to be explored, drying each sample, crushing and screening it so as to

produce particles having a particle size between about 147 and 417 microns, and analyzing such particles for a selected inorganic constituent by emission spectrum analysis, whereby the analyses may be correlated with sample locations to produce a picture from which the presence of subsurface deposits of oil may be prognosticated. - Claims allowed, 3.

7366. Geochemical Prospecting; L. W. Blau, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,330,026, issued September 21, 1943.

A method for prospecting for subterranean petroliferous deposits, which comprises collecting soil samples at spaced points over an area to be explored at a depth at which aerobic bacteria can exist, forming an extract of each sample containing a product of the action of any hydrocarbon-consuming bacteria that may have been in the sample on hydrocarbons, and determining the absorption power of each extract for light, including a band of wave lengths ranging from about 4,600 to 6,000 Angstroms, whereby the results of such determinations may be correlated with sample locations to produce a picture from which the presence of subsurface deposits of oil may be prognosticated. - Claims allowed, 6.

7367. Apparatus for Seismic Prospecting; Herbert Hoover, Jr., Sierra Madre, and Merrill Swan, Pasadena, Calif., assignors to Consolidated Engineering Corporation, Los Angeles, Calif., a corporation of California. U. S. Patent, 2,330,216, issued September 28, 1943.

In seismic prospecting apparatus for reproducing and recording a train of reflected seismic waves, in which there is a gradual shift in the spectrum of the reflected waves from high frequencies to low frequencies during the wave reception, having a receptor for converting the seismic wave train into a corresponding electrical wave train having the same frequency components, the combination of an electrical wave amplifier having an input and output and capable of passing a band of said electrical waves therethrough, a filter intermediate the input and output of the amplifier, a variable inductance serving as a filter element, said inductance being in the form of a reactor wound on a magnetic core, a control winding also wound on the core, a current-supply device connected in series with the control winding, and current-control means connected with the current supply device to vary the current supplied to the control winding as such a function of time as to shift the maximum sensitivity of the amplifier to lower and lower frequencies as a function of time during the amplification of the electrical waves. - Claims allowed, 4.

7368. Geochemical Prospecting; Leo Horvitz, Houston, Tex., assignor to E. E. Rosaire, Houston, Tex. U. S. Patent 2,330,716, issued September 28, 1943.

In geochemical prospecting for subsurface carboniferous deposits, the steps that comprise collecting samples of soil in a region to be explored, subjecting each sample to a treatment suitable for altering the physical structure of water-insoluble carbonates contained therein in such a way as to disengage from said carbonates any constituents associated therewith, recovering from the soil sample a constituent significant of the existence of a subsurface carboniferous deposit, other than a carbonate, or a product of its dissociation, and determining the quantity of said constituent. - Claims allowed, 10.

7369. Geochemical Prospecting; Leo Horvitz, Houston, Tex., assignor to E. E. Rosaire, Houston, Tex. U. S. Patent 2,330,717, issued September 28, 1943.

A method for recovering a sample of gas containing hydrocarbons for analysis from a soil sample containing firmly adhering, normally gaseous hydrocarbons, which comprises confining the soil sample in a closed system, subjecting the sample to a degassing treatment suitable for the removal therefrom only of interstitial gas, discarding such gas from the system, then subjecting the soil sample to an additional degassing treatment to remove therefrom a second quantity of gas, and collecting this latter quantity of gas for analysis for the hydrocarbon content thereof. - Claims allowed, 7.

7370. Geochemical Prospecting; M. S. Taggart, Jr., Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,330,758, issued September 28, 1943.

A method for treating a soil sample for the recovery therefrom of a gas to be analyzed for the presence therein of constituents significant of subterranean petroliferous deposits, which comprises intimately mixing with the soil a substance that, upon treatment with strong mineral acid, evolves a gas other than a hydrocarbon gas, treating the mixture with a strong mineral acid, and collecting the evolved gas for analysis. - Claims allowed, 4.

7371. Method of Geophysical Exploration; H. T. F. Lundberg, Toronto, Ontario, and N. B. Keevil, Swansea, Ontario, Canada, assignors

to Lundberg Exploration S. A., Panama City, Panama, a corporation of Panama. U. S. Patent 2,330,829, issued October 5, 1943.

A method of geophysical exploration including taking samples from the earth at different points in a field being investigated, measuring the radio-activity of emanations held by said samples to determine the ratios between the concentrations thereof at the different points from which samples were taken, and calculating, by comparison of said ratios, the presence and location of a sought-for deposit. - Claims allowed, 23.

7372. Method of Seismic Reflection Surveying; O. S. Petty, San Antonio, Tex. U. S. Patent 2,331,080, issued October 5, 1943.

A method of reflection seismograph surveying that includes the steps of detonating an explosive charge at a first point adjacent to the surface to propagate seismic waves in the earth, detecting the reflections of said waves from subsurface formations at a plurality of spaced second points adjacent to the surface and arranged to form a complete circle, of which said first point is substantially at the center, the spacing between adjacent second points being less than the radius of said circle, and the radius being less than the critical distance corresponding to the critical reflecting angle, and amplifying and recording the wave reflections so detected. - Claims allowed, 5.

7373. Means for Logging Wells; Floyd Willis, Jr., Dallas, Tex. U. S. Patent 2,331,152, issued October 5, 1943.

An apparatus for logging wells comprising a vibration pick-up unit assembly mounted on the Kelly joint of a well rigging and arranged to rotate with the drill stem thereof, said unit being provided with means for transmitting amplitude and traversing electrical impulses and including a sweep device with a light ring and a photoelectric tube, the light ring rotating before the tube to produce an electric current change in the tube proportional to the rotation of the drill bit; the apparatus including an oscillograph for receiving and exhibiting said impulses. - Claims allowed, 1.

7374. Seismic Prospecting System; H. W. Washburn, Pasadena, Calif., assignor to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California. U. S. Patent 2,331,363, issued October 12, 1943.

An apparatus for measuring the relative times required for waves simultaneously generated at a single source to travel to spaced points; wave detectors located at said points adapted to convert received waves into corresponding electrical waves; a group of corresponding electrical wave reproducing elements located in fixed relationship to each other and said points; transmission lines of different lengths connecting the detectors to the respective reproducing elements, said lengths corresponding to the respective distances of the corresponding detectors to the corresponding reproducing elements; equalizing impedances of different values connected in lines of different lengths and so proportioned with respect to the lengths of the respective lines as to assure that waves are applied to the reproducing elements in the same time-phase relationship that they bear at the spaced points; and common time-measuring means connected to said reproducing elements for indicating the relative times of arrival of waves at said points. - Claims allowed, 5.

7375. Seismic Circuit; J. O. Parr, Jr., San Antonio, Tex., assignor to O. S. Petty, San Antonio, Tex. U. S. Patent 2,331,623, issued October 12, 1943.

Means for increasing the sharpness of a time-break signal resulting from the breaking of the blasting-cap bridge wire comprising a resonant circuit adapted to be set in oscillation at high frequency by the voltage change resulting from said breaking; a vacuum tube having a control element biased to normally provide a current flow in the output of the tube; means coupling said element to said circuit to superimpose the oscillation voltages on the said bias; a transformer having its primary winding traversed by said output current; and a recording galvanometer connected to the secondary of said transformer. - Claims allowed, 11.

7376. Method of an Apparatus for Seismic Surveying; J. O. Parr, Jr., San Antonio, Tex., assignor to O. S. Petty, San Antonio, Tex. U. S. Patent 2,331,624, issued October 12, 1943.

The combination with an inertia-type, earth displacement - actuated transducer of the electromechanical style, of a seismometer actuated solely by compression, which results in changing the length of one horizontal axis thereof, and means to combine the effects of said devices for the purposes describes. - Claims allowed, 14.

7377. Geophysical Instrument; G. V. A. Gustafsson, Stockholm, and J. D. Malmquist, Boliden, Sweden. U. S. Patent 2,331,904, issued October 19, 1943.

In an instrument for geophysical prospecting, a mass; means for yieldingly counterbalancing the weight of said mass to permit movement thereof in response to variations in the value of gravity; means for applying equal and oppositely directed forces to said mass, said forces being applied perpendicularly to the direction of movement of said mass when the mass occupies its zero position, but exerting a component of force in the direction of movement of said mass upon departure of said mass from its zero position. - Claims allowed, 5.

7378. Method and Device for Referring a Level in a Borehole to the Bottom of Said Borehole; Marcel Schlumberger, Paris, France, assignor, by mesne assignments, to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,332,348, issued October 19, 1943.

In a method of measuring distances in a borehole from a reference point located a considerable distance from the top thereof, said borehole having a potential distribution therein in the vicinity of said reference point, which varies abruptly therealong, the steps of disposing an electrode on an elastic cable at said reference point in the borehole, pulling up said cable at the surface of the earth, thereby producing an initial elongation thereof without moving the electrode, and beginning the measurements at the instant the potential difference produced between the electrode and a ground point by said potential distribution begins to change, whereby errors caused by elastic elongation of the cable may be minimized. - Claims allowed, 10.

7379. Differential Radioactivity Logging; Daniel Silverman, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,332,873, issued October 26, 1943.

Apparatus for gamma-ray well logging including a water-tight case adapted to be lowered into said well, two ionization chambers mounted within said case a fixed distance apart, said ionization chambers being shielded from penetrating radiation except that coming from a predetermined narrow region, means mounted within said case for alternately shielding said two ionization chambers from penetrating radiation from said narrow region, and means for amplifying and recording the relative response from said two ionization chambers to said radiation. - Claims allowed, 2.

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. C. 7292 AUGUST 1944

UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

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GEOPHYSICAL ABSTRACTS 117

APRIL-JUNE 1944

COMPILED BY

W. AYVAZOGLOU AND V. SKITSKY

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 117
APRIL - JUNE 1944[1]

Compiled by W. Ayvazoglou[2] and V. Skitsky[2]

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FOREWORD

Geophysical Abstracts 1 - 86 were issued in mimeographed form by the Bureau of Mines; Abstracts 87 - 111 were published in bulletins of the Geological Survey; Abstracts 112 - 116 were issued in mimeographed form by the Bureau of Mines as Information Circulars 7256, 7257, 7267, 7273 and 7285.

1. GRAVITATIONAL METHODS

7380. Dryden, H. L. A reexamination of the Potsdam Absolute Determination of Gravity. Jour. Research Nat. Bureau of Standards, vol. 29, No. 5, 1942, pp. 303-314.

Recent absolute determinations of the acceleration of gravity differ from the generally accepted Potsdam value by amounts considerably greater than the probable error assigned to that value by the Potsdam investigators. The discrepancy is due in large part to an adjustment made with the intent of correcting for certain systematic errors. The adjustment was probably not warranted. If this adjustment is not made, the Potsdam result is

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1/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7292."

2/ Physical science analytical editor, Bureau of Mines, U. S. Department of the Interior.

about 12 parts per million less than the commonly accepted value as compared with 14 and 20 parts per million less as found in the recent absolute determinations. The best value of G for general use when accurate absolute values are needed is probably obtained by reducing the local value in the Potsdam system by about 15 parts per million. The Subcommitte on Gravity of the National Research Council Committee on Fundamental Physical Constants has recommended a reduction of 17 parts per million. - Author's abstract.

7381. Duerksen, J. A. Gravity-Anomalies and Meridian Deflections in Hawaii. Nat. Research Council, Am. Geophys. Union, Trans. 1943, part I, Washington, D. C., 1943, pp. 34-39.

Positive gravity anomalies and isostatic deflections in the meridian indicate that the Hawaiian Islands are not isostatically compensated. The present investigation seeks to determine from gravity data, upon the basis of estimates of the islands' density, the increase in the density of the subwater part of the islands necessary for reducing the average gravity anomaly to zero; this increase is then used to determine the new meridian deflections. The investigation deals with the Islands of Hawaii and Oahu possessing the largest number of gravity and latitude determinations. In the computation of isostatic effects a distinction is made between an "island-block" extending from the ocean-floor to the island's surface, and a "compensation-block" standing directly beneath the island-block to a depth of 113.7 km. below the ocean-floor. At first, three anomalies are computed for each gravity-observation; The free air, Hayford-Bowie isostatic, and a special anomaly. Next, the increase of density of the compensation-block, above normal, is calculated from the first two positive anomalies separately for each station. Finally, Hayford isostatic deflections of the vertical in the meridian are computed for each one of the latitude-stations. The special deflections are calculated by using the increase of density of the compensation-block for each island separately. The results lead the author to conclude that the Island of Hawaii is an extra load on the earth's crust, while the Island of Oahu is partly compensated. The deflections of the vertical in the meridan are decreased very considerably, particularly for Hawaii; they corroborate the gravity results in a general way. - V. S.

7382. Hammer, Sigmund. Estimating Ore Masses in Gravity Prospecting (A.S.P.G. Digest). Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 46, 1944, p. 109.

In gravity surveys for oil, the size and depth of structures associated with anomalies are the main interpretative factors. On the other hand, in gravity surveys for ore, the mass of the ore body is important. This difference in interpretation has received scant attention in geophysical literature. Yet mathematical physicists recognize that there is a certain uniqueness in the determination of the magnitude of the mass anomaly from the observed gravity anomaly. The anomalous mass is here calculated by the surface integral of the product of area and relief of the gravity anomaly which it causes. This distinction must be clearly recognized. - V.S.

7383. Jeffreys, Harold. The Stress-Differences in the Earth'S Shell. Monthly Notices of the Royal Astronomical Soc., Geophys. Suppl., London, vol. 5, No. 3, 1943, pp. 71-89.

The stress-differences needed to support given surface loads due to harmonics of degrees 2 and 3 have been estimated on four hypotheses: (1) Elastic loading of a uniform sphere; (2) inelastic loading of a uniform sphere, with continuous stress at the center; (3) and (4) inelastic loading of a sphere with no stress-differences within distances 0.545a and 0.9a of the centre, "a" being the radius. Mean stress-differences are also found on hypotheses (3) and (4) for loading due to harmonics of degrees 10 and 30. Combining the results with the observed distribution of gravity, it is found that the strengths needed on hypothesis (3) are about 150 x 10^6 dynes/cm.^{2} at depths down to about 0.1 of the radius and about 80 x 10^6 dynes/cm.^{2} down to the core. On hypothesis (2) strengths of about 330 x 10^6 dynes/cm.^{2} are needed throughout the outer tenth of the radius. The uncertainty of the coefficient of P_2 in gravity found from the precessional constant by de Sitter's method is estimated from the variation of gravity in other harmonics not consistent with the hydrostatic state. It is found to be 5.9 milligals virtually based on four degrees of freedom. - Author's abstract.

7384. Lockenvitz, A. E. The Periodic Variations of the Gravitational Force. I. Geophysics, Menasha, Wis., vol. 9, No. 1, 1944, pp. 94-105.

The expression for the variation of the gravitational field, at a particular place on the earth's surface, due to a tide producing body is put into a form which does not neglect terms or factors which will produce changes in the gravitational field of as much as 0.001 milligal. A method of carrying out routine calculations by means of a series of graphs is described. - Author's abstract. (See also Geophys. Abs. 116, No. 7263).

7385. Mikhailov, A. A. Gravity Surveying in the U.S.S.R. (in Russian). Internat. Geol. Congress, Rept. of 17th Sess., Moscow-Leningrad, 1937, vol. 4, Moscow, 1940, pp. 427-430.

Prior to 1932 gravity surveying was carried on in Russia without broad planning. In 1932 a Government decree authorized the Main Office of State Surveying and Cartography to make a general gravimetric survey of the entire territory of the U.S.S.R., with a mean density of one gravity station to every 1,000 km. This work is designed to meet the demands of geophysics, geology, and geodesy. The progress of the survey is indicated by the growing numbers of stations established annually on land and at sea: 1923 - 29; 1928 - 136; 1932 - 768; 1936 - 1,759. At present the European part of the U.S.S.R. and some districts in Asiatic U.S.S.R. are covered with gravity stations of standard density. - V. S.

7386. Miller, B. L. Specific Data on the So-Called "Reading Overthrust". Bull. Geol. Soc. America, Baltimore, Md., vol. 55, No. 2, 1944, pp. 211-245.

In 1934 Stose and Jonas proposed the hypothesis that much of the crystalline rock and Hardyston mass in the area west of Reading is a great overthrust sheet. The older rocks here do not pass under the younger valley rocks in a normal folded sequence but overlie them in a tectonic series in which the position of the members is due to overthrusting. In testing this hypothesis, the author examined several types of field evidence. A part of the evidence was gravimetric; it was supplied by the measurements of the United States Coast and Geodetic Survey in the Bethlehem region in 1935, as well as by the work of Woollard in 1939, Hersey in 1941, and Nettleton in 1941. This gravimetric material is studied now with respect to various aspects of the overthrust problem. The author concludes from the total evidence that the overthrust hypothesis is not supported. - V. S.

7387. Peoples, J. W., Wells, F. G., Thayer, T. P., and Howland, A. L. Geologic Principles in the Search for Chromite Ore (Abs.). Econ. Geol., Lancaster, Pa., vol. 38, No. 1, 1943, pp. 81-82.

Since 1939 the United States Geological Survey has investigated many of the known chromite deposits in the Western Hemisphere, including all the principal mines in Alaska, the United States, Brazil, Cuba, Guatemala, and Mexico. Two principal types of deposits have been recognized - stratiform and sackform. Some conditions of their occurrence and guides for prospecting are indicated. Geophysical prospecting by gravimeter and magnetometer, directly or indirectly have been moderately successful in certain situations, but are subject to severe limitations. - Condensed by V. S.

7388. Rey, P., and Oks, M. Coordinación de métodos geofísicos (Coordination of Geophysical Methods). Bol. Inform. Petrol. (YPF), Buenos Aires, vol. 20, No. 230, 1943, pp. 3-15.

The Department of Exploration of the Argentine Y.P.F. (Administration of Government Oil Fields) made geophysical surveys in the Provinces of Chaco, Slata, Mendoza, Neuquen, etc. The application of various methods was guided by available information and respective costs. The gravimetric method, supplemented by the seismic method, was found to be most suitable for local problems; approximate costs are given. The causes of gravimetric anomalies were judged to be the structure of formations (pointing to oil), the position of planes of discontinuity, the location of the basement, lateral variations in the density of formations, and the influence of surface irregularities. The results of exploration have shown that the application of geophysics in Argentina is eminently satisfactory. Numerous geophysical maps are appended. - V. S.

7389. Shneerson, B. L. The Gravitational Anomalies in the Ishimbaev District (in Russian). Compt. rend. (Doklady) Acad. Sci. l'U.R.S.S., Moscow, new ser., vol. 29, Nos. 5-6, 1940, pp. 390-393.

Gravitational anomalies are correlated with the presence of salt deposits and anhydrite lenses in the Artinskian (Permian) limestone. Deep wells permit direct comparison of the geology with the anomalies. - Annotated Bibliography of Economic Geology for 1942, vol. 15, no. 1, 1943, p. 124.

2. MAGNETIC METHODS

7390. Bronstein, K. G. The Kursk Magnetic Anomaly (in Russian). Internat. Geol. Cong., Rept. of 17th Sess., Moscow-Leningrad, 1937, vol. 4, Moscow, 1940, pp. 181-199.

The Kursk magnetic anomaly was first observed in the 18th century, but the quartzite and iron ore deposits were discovered in 1924-31. Now 14 ridges are known in the Kursk and Kharkov regions. The total area explored magnetically approximates 88,000 sq. km.; gravimetrically, 12,400 sq. km.; and seismically, 5,000 sq. km. In the course of this work, a combined geophysical method was developed which has yielded new dicoveries. The Shchigry and Korobkovo-Lebedi districts are estimated to hold 200,000,000 tons of ore. The total reserve of quartzite ores known so far amounts to hundreds of billions of tons. Still, only part of the region is geophysically surveyed. The author praises highly the combined use of magnetic, gravitational, and seismic principles. The field work in the surveyed area is accompanied by theoretical studies of the causes of the magnetic property of quartzite, telluric currents, etc. Now light may be expected on a number of geophysical and geological problems. - V. S.

7391. Coast and Geodetic Survey, U. S. Department of Commerce. Uses of Magnetic Stations, Spec. Pub. 213, Washington, D. C., 1943, 7 pp.

A variety of information is supplied for magnetic exploration: (1) Description of the compass and early surveys of the United States. (2) Definitions of such phenomena as magnetic declination, secular and annual changes, diurnal variation, magnetic storm, local disturbance, and compass correction. (3) Compass surveys and the true meridian; the best method of referring the compass bearings to a true meridian is by observations of the Polaris or of the sun; otherwise it is necessary to maintain a true meridian line and to determine the magnetic declination; as a last resort, the secular change data may be used. (4) Magnetic survey of the United States by the Coast and Geodetic Survey made at county seats and other places. (5) Description of magnetic observatories at Cheltenham, Md.; Honolulu, Hawaii; San Juan, P. R.; Sitka, Alaska; and Tucson, Ariz. (6) Bibliography on the use of the compass. - V. S.

7392. Dubief, J. Resultats des mesures magnétiques au Sahara (Results of Magnetic Measurements in Sahara). Trav. Inst. Mét. et Phys. Globe de l'Algérie, Alger, No. 1, 1943, pp. 1-15.

Contains results of magnetic measurements at 85 stations made from October 1940 to December 1942, together with brief descriptions of the stations. - Terrestrial Magnetism and Atmospheric Electricity, vol. 48, No. 4, 1943, p. 254.

7393. Fleming, J. A. Geomagnetism in Latin America. Proc. of 8th Am. Sci. Cong., 1940, Washington, D. C. vol. 7, Physical and Chemical Sciences, 1942, pp. 47-56.

Geomagnetism is a study of the magnetic and electric fields of the earth. An outline is presented of such studies in Latin America. Intensive work was begun in 1905 by the Carnegie Institution of Washington, in the course of its world magnetic survey on land and sea. At present, there are 15 permanent magnetic observatories in the Americas, of which 8 are in Latin America; 2 more observatories are desirable, in Brazil and Chile. Particularly important is the Huancayo Observatory in Peru, near the magnetic equator; it carries on observations of solar radiation, the magnetic influence of the moon, and the ionosphere. In Bermuda and Guatemala special investigations are made of the effect of unusual geological features on the magnetic field. The various problems investigated in Latin America are briefly discussed. - V. S.

7394. Fleming, J. A. The Sun and the Earth's Magnetic Field. Ann. Rept. Smithsonian Institution, 1942, Washington, pp. 173-208.

The sun affects the earth's magnetism through the outer atmosphere. This relationship affords data for the study both of magnetic and solar phenomena. The author at first deals with sun-spots and other solar characteristics. He then describes the earth's magnetic field with respect to time changes of a regular and irregular type, magnetic activity and its measurement, various indices, magnetic disturbances of various extent, influence of the sun's radiations, relation to sun-spots, epoch-methods, etc.; most questions are treated in their historical perspective. The related subjects under discussion are ionospheric and solar relations, earth currents, recent geomagnetic and auroral disturbances, cosmic-ray relations, and the laboratory approach. A bibliography is appended, and numerous plates illustrate the text. - V. S.

7395. Fleming, J. A. and Scott, W. E. List of Geomagnetic Observatories and Thesaurus of Values, III. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 48, No. 4, 1943, pp. 237-242.

Table 1, Annual Values of Geomagnetic Elements at Observatories, is continued in this issue (for parts I-II of this table see Geophys. Abstracts 114, No. 7015, and 115, No. 7141). - V. S.

7396. Healy, J. Boron in Hot Springs at Tokaanu, Lake Taupo. New Zealand Jour. Sci. and Technol., Wellington, vol. 24, No. 1B, 1942 pp. 1-17.

In connection with the field-work described in this article, a magnetic survey of the Tokaanu area was made. A series of 100 observations of vertical intensity was made over a strip extending from a mile northwest to 3 miles southeast of the township using a Schmidt vertical magnetometer of the Askania type. The results indicated that in the vicinity of the thermal activity, there are areas of low magnetic intensity. The article is accompanied by a map showing magnetic anomalies and thermal activity in the vicinity of Takaanu. - Terrestrial Magnetism and Atmospheric Electricity, vol. 48, No. 4, 1943, p. 256.

7397. Herroun, E. F., and Hallimond, A. F. Laboratory Experiments on the Magnetization of Rocks. Proc. Phys. Soc., London, vol. 55, No. 309, 1943, pp. 215-221.

Experiments were carried out on a number of rock-samples to determine the intensity of magnetization induced under a variety of conditions. (1) Some specimens were heated to red heat and allowed to cool in the earth's magnetic field. The organization of the experiments is described. When the specimens had cooled, their magnetization was measured and found greatly increased. Moreover, the specimens retained their magnetic properties and showed no appreciable change after 4 months. (2) Other specimens were kept cold and subjected to the influence of a magnetic field. Weak fields, such as the earth's field, produced no magnetization at all. Higher fields produced rapidly increasing magnetization. Very large fields were needed to induce the same magnetic intensity as induced by cooling; even then it was not permanent but died away slowly. If two successive magnetizations were induced at right angles, the second magnetization reduced the first magnetization. The authors compared these results with rocks magnetized naturally. It was found that certain rocks have a natural magnetization as great as that produced by cooling in the earth's field. The conclusion is advanced that such rocks must have become magnetized during a cooling process, because to produce the same results cold would have required a field between 10 and 30 times as great as the present field of the earth (for previous work by the authors, see Geophys. Abs. 56, No. 1689). - V. S.

7398. Hurwitz, Louis, and Howe, H. H. Magnetic Observatory Results at San Juan, Puerto Rico, for 1926-28. U. S. Coast and Geodetic Survey Washington, D. C., MO-16, 1943, 138 pp.

This publication contains extensive tables of observatory results, reproductions of magnetograms showing the more important magnetic storms, and an explanatory text. The tabulated results include hourly mean values of the magnetic elements D, H, and Z, summaries of their monthly and annual means, collected mean diurnal variations for each month, season, and year, lists of principal magnetic disturbances, amounts of noncyclic

change, observed and adopted baseline values of the D, H, and Z variometers with their abrupt changes, etc. The text includes a description of instruments, discussions of their coefficients and behavior and of the procedures used, and explanations of the various tables. - Authors' abstract.

7399. Johnston, H. F. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for July to September, 1943. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 48, No. 4, 1943, pp. 228-231.

Tables are given. - V. S.

7400. Johnston, H. F. Mean K-Indices from Twenty-One Magnetic Observatories and Five Quiet and Five Disturbed Days for 1942. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 48, No. 4, 1943, pp. 219-227.

Tables are given. - V. S.

7401. Orlov, A. Polo Movement from 1891.5 to 1940.0 Compt. rend. (Doklady) Acad. Sci. l'U.R.S.S., Moscow, new ser., vol. 37, No. 9, 1942, pp. 269-273.

Astronomers have sought to establish a constant, or average, position of the pole for stabilizing latitudes, longitudes and azimuths. The writer defines the "average pole" as the position which the pole would occupy were it not for its periodical movement. The average position of the pole at any moment is determined by average latitudes at this moment for various points of the earth's surface. Coordinates of the pole should be computed upon the basis of the deviation of the instantaneous latitude from the mean latitude. The author has calculated the coordinates of the instantaneous pole for a period of 48.5 years, from 1891.5 to 1940.0, according to stated rules and source material. The computations were made on the assumption that the pole is not subject to secular variations. The results are embodied in a table: "Pole coordinates in relation to the mean pole of the epoch." - V. S.

Peoples, J. W., Wells, F. G., Thayer, T. P., and Howland, A. L. Geologic Principles in the search for Chromite Ore (Abstract). Econ. Geol., Lancaster, Pa., vol. 38, No. 1, 1943, pp. 81-82. (See Geophys. Abstract 7387.)

7402. Terrestrial Magnetism and Atmospheric Electricity. Notes: Magnetic Surveys in South and North America. Baltimore, Md., vol. 48, No. 4, 1943, p. 253.

The magnetic field-party of the United States Coast and Geodetic Survey that has been operating in South America for nearly a year has returned to the United States. Magnetic observations were made in every republic. The program was primarily one of repeat-observations, but several new stations were established near airports in Brazil. Comparison-observations were made at the Huancayo Magnetic observatory in Peru, the Pilar Magnetic Observatory in Argentina, and the Vassouras Magnetic Observatory in Brazil. An observer of the Instituto Geográfico Militar occupied about 50 declination-stations in Uruguay, and another party established 5 good magnetic stations along the coast of Uruguay, using an Askania magnetometer. At all of the latter stations diurnal-variation observations were made over a 3- or 4-day period. Two field-parties of the Coast and Geodetic Survey that had been making repeat-observations in the eastern half of the United States closed their season's work early in November 1943.

7403. Walton, M. S., Jr. Magnetic Exploration of the Bohemia Basin Nickel-Copper Deposits, Southeastern Alaska (Abs.). Econ. Geol., Lancaster, Pa., vol. 39, No. 1, 1944. p. 104.

The Bohemia Basin nickel-copper deposits form a part of a composite stock on Yakobi Island, southeastern Alaska. They are segregations of pentlandite, pyrrhotite and chalcopyrite in a zone near the inward-dipping lower contact of a norite mass. In 1943 eight traverses were made in the covered area with an Askania vertical intensity magnetometer. A deposit was detected beneath six of the traverses. The magnetic profiles are consistent with the hypothesis, proved at two places by outcrops and drill hole, that the deposit dips inward. The inferred quantity of sulfide-bearing material in the deposits in the norite mass was increased as a result of the magnotometer work from 5,000,000 to 8,500,000 tons. The magnetic data will facilitate further development of the deposits and would have been useful in the more effective placing of some of the holes already drilled. - V. S.

7404. Wantland, Dart. Magnetic Interpretation. Geophysics, Menasha, Wis., vol. 9, No. 1, 1944, pp. 47-59.

It is common knowledge that magnetic anomalies do not always correspond to structural uplifts. The author discusses this problem under the headings of: (1) examples, (2) the magnetic character of sediments, (3) possibilities of magnetic stratigraphic studies, and (4) the place of magnetic surveying. - Author's abstract. (The paper is accompanied by discussions by D. M. Collingwood and by L. J. Peters).

3. SEISMIC METHODS

7405. Berson, I. S. Odographs of Repeatedly-Reflected Waves, Refracted-Waves, and Refracted-Reflected Waves (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Sér. Géograph. et Géophys., Moscow, No. 6, 1942, pp. 274-289.

Equations for odographs (hodographs) of repeatedly reflected, reflected-refracted, and refracted-reflected longitudinal waves are derived for the case of one separating plane. The question is studied what results may be obtained from the interpretation of odographs of the waves described, refracted or reflected only once. Geometrical criteria are laid down for the recognition of the repeatedly-reflected waves and of other types of waves in some special cases. - Author's abstract.

7406. Gaby, P. P. A New Type of Seismic Cross-Section Wherein Accuracy of Representation is Rendered Insensitive to Velocity Error (A.A.P.G. Digest). Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 46, 1944, p. 105.

In seismograph computations the reflection arrival-time is converted to depth by using a velocity function. But velocities cannot be assumed constant over large areas. Thus, it is necessary to use interpolation or extrapolation in selecting the velocity function for different localities. Such a procedure is complicated and inaccurate, and it requires much recomputation. The author seeks a method for reducing velocity errors in computations. The use of time-sections and time maps usually involves the assumption that the horizontal offset of the reflecting point is zero; such an assumption may largely invalidate results in areas of deep or sharp folding, or in faulted areas. Most other procedures adopt some velocity function before representation; such a representation is very sensitive to error in the assumed function, so that subsequent recomputation must begin at the point where the velocity function was first used. To meet these criticisms the author proposes a new method. A concept is advanced of a section wherein the horizontal coordinate is the horizontal distance and the vertical coordinate is the vertical travel time. A cross section in such space utilizes a velocity function to determine the horizontal offset of each reflecting point and the computed vertical time from reflecting point to reference plane. The plotting of seismic data in these coordinates is described and discussed. The representation of data in terms of this system is insensitive to errors in the assumed veolcity function. - V. S.

7407. Gebhardt, R. E., and Nelson, J. H. The Seismological Installation at the Sitka Magnetic Observatory. Nat. Research Council, Am. Geophys. Union, Trans. 1943, part I, Washington, D. C., 1943, pp. 91-95.

Various defense projects at Sitka, Alaska, forced the moving of he local magnetic observatory to the outskirts of the town in the fall f 1940. The seismological installation of the observatory is now lo- ated in a reinforced-concrete vault built into the side of a hill. t is equipped with Wenner seismometers and a motor-driven seismograph ecorder. The recorder has an electric circuit so arranged that the drum peed is controlled by a short impulse from the observatory clock. The mpulse turns on the power for a motor, while a cam on the motor shaft nterrupts the circuit after an adjustable time interval. The motor s a small D. C. device used for flasher-mechanisms; it can run about year on three or four dry cells. The observatory clock has an invar taff and metal bob; it is equipped with contacts that operate once per econd and once per minute, respectively, while two separate sets operate nce per hour. As a result of those arrangements, the drum speed of the ecorder is very uniform. - V. S.

7408. Gillin, J. A., Arnett, R. D., and Alcock, E. D. The Correlation Refraction Method of Seismic Surveying (Am. Assoc. Petrol. Geol. Digest). Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 46, 1944, pp. 106-109.

The reflection method of seismic prospecting is found to fail in ome areas. The causes are surface conditions, discontinuities in the ubsurface, lateral changes in velocities, etc. Accordingly, each area ust be studied in its own terms to remedy the failure. Still, in some ases no remedy can be found. Such is the case of the Edwards Plateau in West Texas. The cause here seems to be a thick and hard lime on he surface. This conclusion is based upon the observation that in he sections of the plateau where the lime is absent, thin, or overlain, the reflection method does work. A successful solution for the plateau as been the correlation refraction method. It is based upon the in- terpretation of the recorded arrivals of energy traveling from the shot oint to the instruments along refracted paths. The interpretation is ot necessarily confined to one horizon. The paper discusses the under- lying theory of this method and describes the field technique. - V. S.

7409. Gutenberg, Beno. Variations in Physical Properties Within the Earth's Crustal Layers (Abstract). Nat. Research Council, Am. Geophys. Union, Trans. of 1943, part I, Washington, D. C., 1943, pp. 281-282.

An investigation was made in southern California of the amplitudes of P-waves having epicentral distances from 50 to 570 km.; 300 instances were used. This investigation shows that the velocity of longitudinal waves in a granitic layer at depths of 2 to 18 km. is V = 5.56 + 0.001 h (in km./sec). Similarly, the investigation of Py-waves gives a velocity of 6.0 + 0.01 (h-18) in km./sec. for the (first) intermediate layer. Inside the granitic layer the amplitudes of Py-waves should about equal those of Pn-waves.

The velocity of Pn below the Mohorovicic discontinuity at a depth 35 to 40 km. is close to 8.0 km./sec. The velocities of both P and S

at first increase with depth, but the rate of increase falls off rapidly with increasing depth; as a result, the amplitudes of Pn and Sn rapidly decrease with distance beyond $\Delta \approx$ 200 km. Since amplitudes of various P and S waves change with distance in a similar way, the effect of pressure and temperature on the coefficient of rigidity must be relatively the same as on the bulk-modulus.

It may be concluded that at a depth of about 80 km. the melting point of the material is reached. Immediately above that critical depth, the effect of temperature on the bulk-modulus and on the coefficient of rigidity may approach, or even surpass, the effect of pressure. At the critical depth itself, there may be a slight sudden decrease of the wave-velocity. At greater depth, the effect of the temperature on the bulk-modulus and the coefficient of rigidity becomes more and more insignificant. Whereas above the critical depth a certain minumum stress is required to start plastic flow, below this depth no appreciable strength exists, and the plastic flow is controlled only by the viscosity of the material. - V. S.

7410. Hayes, R. C. Earthquakes in New Zealand During the Year 1941. Dominion Observatory, Bull. S.68, Wellington, 1943, pp. 210b-211b.

New Zealand's earthquakes during 1941 are listed with their dates and approximate times. An accompanying map shows the epicenters of the principal earthquakes; shocks with origins deeper than normal are indicated by distinctive signs. Two smaller maps give the approximate isoseismals for the two largest earthquakes during the year. A note is added on the main features of the earthquakes of 1941. - V. S.

7411. Heck, N. H. Advances in Engineering Seismology. Civil Eng., New York, vol. 12, No. 1, 1942, pp. 30-34.

In seismological blasting it is sometimes necessary to determine the possibility of injuries to buildings. This paper outlines the report of N. H. Heck on the strong-motion research of the U. S. Coast and Geodetic Survey, prepared for the Joint Committee on Seismology of the Soil Mechanics and Foundations Division, American Society of Civil Engineers. In its work, the Coast and Geodetic Survey uses three general types of strong-motion instruments: Accelerographs, displacement meters, and Weed instruments. They measure acceleration, velocity, ground displacement (oscillatory), and periods; special research has been conducted to test the accuracy of these determinations. Since the start of the work in 1933, five earthquakes were recorded. The relationship of earthquake destructiveness to the elements of earth motion has not been so far fully established. The most important problems in this relationship are acceleration, resonance, and duration, including accumulative effects of strong aftershocks. These problems are discussed in connection with the instruments and methods of study. - V. S.

412. Holmes, W. O. Preventing Power-Line Mishaps in Seismograph Shooting. Oil Weekly, Houston, Tex., vol. 113, No. 4, 1944, pp. 26-28.

Seismograph shooting raises some special problems in addition to the usual precautions of blasting. The problem here considered is shooting near power-lines. The copper wires loading from the shooting truck down the hole to the blasting cap are usually blown up into the air by the explosion. If they come in contact with power-lines while connected with the truck, an electric shock may injure the personnel on the truck. This danger has been recently eliminated by substituting a patented detonating fuse for the portion of the wire extending down the hole. The fuse consists of an explosive core of pentaerythritetetranitrate (PETN) contained within a flexible, waterproofed textile covering. The fuse can be initiated by a No. 6 electric blasting cap and will detonate throughout its entire length. It is relatively insensitive to shock, friction, flame, and water. The danger of contact with power-lines in the air is eliminated because detonation completely disintegrates the fuse. Field tests of the fuse, methods of using it, and various precautions are described. - V. S.

7413. Neumann, Frank. United States Earthquakes, 1941. U. S. Coast and Geodetic Survey, Washington, D. C., Serial 655, 1943, 71 pp.; price, 20 cents.

This summary of earthquake activity in the United States and regions under its jurisdiction for the year 1941 covers: (1) Noninstrumental results in the various States and Territories; (2) miscellaneous activities: geodetic operations of seismological interest, and tidal disturbances of seismic origin; (3) seismological observatory results on epicenters; (4) strong motion seismograph results: shocks, records, constants, and stations; and (5) tilt observations. The abridged scale of the "Modified Mercalli Intensity Scale of 1931", adopted since 1931 in place of the Rossi-Forel scale to designate the intensity of earthquake activity, is given in the introduction, together with equivalent intensities according to the Rossi-Forel scale. - V. S.

7414. Ongley, M. Wairarapa Earthquake of 24th June, 1942, Together with Map Showing Surface Traces of Faults Recently Active. New Zealand Jour. Sci. and Technol., B. General Section, Wellington, New Zealand, vol. 25, No. 2, 1943, pp. 67-78.

The distribution of intensest shaking during the Wairarapa earthquake of 24th June 1942, as indicated by structure-damage and ground-disturbance, is described. The surface trace of the fracture on which movement occurred is mapped. Many similar movements have taken place in the past, here and elsewhere in New Zealand. A map showing the known surface traces of recently active faults is appended. - Author's abstract.

Rey, P., and Oks, M. Cordinación de metodos geofisicos (Coordination of Geophysical Methods). Bol. Inform. Petrol. (YPF), Buenos Aires, vol. 20, No. 230, 1943, pp. 3-15. (See Geophys. Abs. 7388.)

7415. Richter, C. F. Calculation of Small Distances. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 33, No. 4, 1943, pp. 243-350.

Tables are presented which facilitate the calculation of small distances between points on the earth's surface whose latitudes and longitudes are given, for mean latitudes from 30° to 40°. The error does not exceed one-tenth of a kilometer in 500 kilometers, and may be reduced by applying specified corrections. - Author's abstract.

7416. Rosaire, E. E. Reflection Seismograph Performance Along the Gulf Coast. Oil Weekly, Houston, Tex., vol. 113, No. 6, 1944, pp. 16-24.

The reflection seismograph is the main prospecting method at present. It has dominated exploration on the Gulf coast since about 1930. The author studied the performance of this method on the Gulf coast to determine its typical measure of success. A measure of success is defined as the ratio of attainment to effort. This ratio was computed in three different ways for the period 1929-43. The methods of computation, data, resulting ratios, and deduced trends are discussed, and conclusions are drawn. (1) The achievement-ratio, expressed in confirmation per crew-year, was abnormally high in the first 2 discovery years, then dropped abruptly, but since has shown a slow linear increase indicating the technical improvement of the reflection method. (2) The initial-risk ratio, expressed in crew-years per confirmation, has decreased and finally became reduced by 50 percent over a period of about 10 years. (3) The gross-reward ratio, expressed as millions of barrels discovered per crew-year, showed an expotential decrease of 50 percent every 2.5 years. Thus, the exploration technologist is justified in his reliance upon the reflection seismograph, as evidenced by the increasing achievement-ratio. But the executive finds that the initial-risk ratio has halved once and so decreased by 50 percent over the past 10 years, while the gross-reward ratio has halved four times in succession and so has decreased about 93 percent in the same period of time. - V.S.

7417. Science News Letter. Mexican Seismograph. Washington, D. C. vol. 43, No. 14, 1943, p. 212.

Further information is supplied on the installation of a seismograph at Tonantsintla, Mexico (see Geophys. Abs. 115, No. 7167). The instrument is one of the latest models of the vertical-component Benioff. It has a photographic recorder and is capable of magnifying the ground motions by as much as 250,000 times. The Astrophysical Observatory, where it will be placed, is located east of Popocatepetl and Istaccihuatl Volcanoes. Mexico is believed to be a favorable place for a study of the related problems of earthquakes and volcanoes. The relationship between these problems has been recently emphasized by the appearence of a new volcano in a region where earthquakes have occurred for a long time. - V. S.

418. Shugart, T. R. Frequency Discrimination in the Low Velocity Zone. Geophysics, Menasha, Wis., vol. 9, No. 1, 1944, pp. 19-28.

The various factors controlling the "character" of reflection seismograph records are so numerous and so complex that it is very difficult to isolate and investigate each of them experimentally. One of these factors is the frequency discrimination due to multiple reflections in the low velocity zone ("weathered layer"). With a few simplifying assumptions, this problem reduces to one already treated in the classical theory of acoustics. It is shown that for a given weathering thickness the transmission is a periodic function of frequency. The ratio of the maximum to the minimum energy transmission is nearly equal to the square of the ratio of the specific acoustic impedance of the high velocity to that of the low velocity material. The phase lag due to the presence of the weathered layer is shown to be a nonlinear function of the weathering thickness for any given frequency. Graphs of transmission as a function of frequency are shown for various thicknesses of the low-velocity zone. - Author's abstract.

419. Stulken, E. J. Effect of Ray Curvature Upon Seismic Interpretations (A.A.P.G. Digest). Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 46, 1944, p. 109.

In seismic interpretations, the effect of ray curvature on velocity is not calculated with sufficient fullness. The present study analyzes the errors in the computation of specific velocity functions. The analysis is based upon assumptions of a straight path. The discrepancies arising from the use of straight-line depth-determinations are discussed. Dip and offset computations are considered for cases of dipping reflectors. The inaccuracies are illustrated graphically as variables dependent on spread and depth. In some cases, errors are introduced into computations of velocity over curved paths by neglecting irregularities in observed data so as to employ a simple velocity equation. An example is given to show that the usual curved-path procedure may be invalidated by the existence of sloping isovelocity surfaces; vertical travel-time approximations may be more accurate, and they are more easily applied. - V. S.

4. ELECTRICAL METHODS

7420. Easton, W. H. Subsurface Structure and Oil Possibilities of Parts of Edwards, Richland, and Wabash Counties, Ill. Illinois State Geol. Survey, Urbana, Press Bull. Ser., Illinois Petroleum, No. 46, 1943, 12 pp.

A structural study was made in the region of the Bonpas, Bonpas West, Parkersburg, and Samsville oil pools in Illinois. The purpose was to recommend areas for oil exploration and to make contour maps of possible producing formations. The study was made by means of sampling

and electrical logging; the latter registered self-potential and resistivity. The contoured horizons were the top of the Levias member of the Ste. Genevieve formation, the top of the lower limestone of the Golconda formation, and the base of the middle bench of the West Franklin limestone. The most important structural feature of this area is a series of domes and anticlines aligned nearly north-south and constituting a definite structural trend; the other features include four anticlines with trends about east-west, a depression east of the major trend, and a regional dip from east to west. The data are tabulated, contour maps compared, and recommendations made for drilling. Maps and logs illustrate the text. - V. S.

7421. Gardner, A. M. Electrode Design Solves Problem of Electrical Logging in Oil-Base Drilling Fluids. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 9, No. 3, 1943, pp. 24-26.

Since oil is a nonconductor of electricity, currents from the formations would not reach the standard logging electrode through oil. Therefore, electrical logging in oil-base drilling fluids requires a special type of electrode. The Lane-Wells Co. has developed such an electrode. The problems involved were manifold; they are briefly indicated. The original design has remained generally the same. The electrolog assembly is composed of three to six elliptical springs with their ends attached to sliding collars which ride with a short range of movement along sections of the main stem. These elliptical springs have the shape of birdcages. There are stop collars set on the main stem which prevent the "birdcages" from passing beyond their sections. Each section is electrically insulated from the others. The birdcages are equipped with cutters fixed at the high point of each of their elliptical springs. These cutters penetrate the oil-mud film covering the formations. For this purpose they are wedge-shaped, are made of hard material, and protrude about 3/4 inch above the face of the springs. Such a design insures a sufficiently firm and sliding contact with the walls of the hole for the passage of electrical current. The electrolog assembly can be adjusted by changing the spacing to give different types of logs. A drawing illustrates the instrument, and examples of various logs are appended. Admixtures of oil-base fluids are discussed. - V. S.

7422. Hurd, C. O. Topography's Effect in the Equipotential Line Method. Mines Mag., Denver, Colo., vol. 34, No. 1, 1944, pp. 15-18, 39, 41.

The equipotential-line method locates ore bodies through the distortions which they produce in the lines; but topography itself produces distortions, and apparently it is not possible to correct equipotential lines for the topographic effects. Therefore, it is necessary to distinguish between the effects of topography and the effects of ore bodies. The present experiment was made for determining the extent of distortion produced in equipotential lines by hills and depressions. The apparatus and procedure are described. A search electrode was used to trace equipotential lines on four clay topographical models; for each line a bridge with variable resistance-arms was balanced at the start for a null indication

n the ammeter and was kept at that setting until the entire line was ompleted. In some cases, models of ore bodies were placed in different ositions in the clay patterns. Samples of tracings are presented for evel ground, and for hills and depressions of various form; the profiles f voltage for different models are given. It is found that equipotential ines bend outward around hills; and they bend inward toward the center of epressions. Admittedly, ore bodies can be so located with respect to topo- raphy that they would not be discoverable. In most cases, however, it hould be possible to separate the effects of topography from the effects f ore bodies. - V. S.

7423. Kornfeld, M. M. Subsurface Correlation by Detailed Electrolog Tabulation (A.A.P.G. Digest). Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 46, 1944, p. 109.

Subsurface correlation can be made by a method of detailed electrolog abulation as yet undescribed in the literature. The procedure consists of a superimposition of curve for curve for any two electrologs studied; t is made on a light table. Certain directions are prescribed for matching the curves. The data and measurements gathered by the matching re tabulated in six columns: (1) Electrical curves and markers employed; 2)-(3) the correlative depths of any two wells studied; (4)-(5) the differences between correlation points; and (6) the departures from normal (gains and losses) in the differences between correlation points. This method is quantitative and superior to graphic methods. There is no need to alphabetize and color electrolog sections, so that electrolog strips are preserved as factual rather than interpretative material. A graphic analysis can be made further of the quantative electrolog correlations. The light-table should preferably be of the fluorescent type. - V. S.

7424. Tikhonov, A. N. The Effect of Inhomogeneity of the Earth's Crust on the Field of Terrestrial Currents (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Sér. Géograph. et Géophys., Moscow, No. 5, 1942, pp. 207-218.

The distortion of the field of terrestrial currents caused by a body possessing the form of an infinite horizontal cylinder embedded in the ground is studied. Curves are given of isopotential lines and of apparent resistances depending on the position of the embedded body and its electric resistance. - W. A.

7425. Wilcox, S. W. Sand and Gravel Prospecting by the Earth Resistivity Method. Geophysics, Menasha, Wis., vol. 9, No. 1, 1944, pp. 36-46.

The four-electrode earth-resistivity method is applied to the search for sand and gravel deposits in the glaciated areas of the United States. This technique differentiates between clays and granular materials enabling the prospector to outline and roughly estimate the quantities of each without test pits or boreholes. Several examples of field surveys are given. - Author's abstract.

5. RADIOACTIVE METHODS

7426. Barcklow, J. C. Adaptability of Radioactivity Logs to Limestone Zones in Old and New Wells. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 9, No. 2, 1943, pp. 18-21.

The neutron and gamma-ray curves of the Lane-Wells radioactivity log are useful for oil and gas tests in limestone zones. Three examples are described: (1) Gamma-ray and neutron logs for a well in the Cushing-Drumright area, Okla.; (2) an electrical log compared with gamma-ray and neutron logs for adjacent wells in the Beebe area, Pontotoc county, Okla.; and (3) an electrical log compared with gamma-ray and neutron logs for the same well in northwestern Kansas. It is concluded that the gamma-ray curve is useful because it differentiates limestones, sandstones, dolomites, and conglomerates from shale bodies. The neutron curve is useful in limestone zones because it gives good indication of strata that contain liquid and are thus necessarily porous; electrical resistivity logs for such zones vary excessively and have little value. The radioactivity logs and the examinations of samples from wells are all that is necessary for tests in areas producing from limestone. - V. S.

7427. Beers, R. F. The Radioactivity and Organic Content of Some Paleozoic Shales (Am. Assoc. Petrol. Geol. Digest). Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 46, 1944, p. 105.

The important radioactive elements in sedimentary rocks are uranium, thorium, and potassium. The previous studies by Beers and Goodman has shown four principal loci where these elements can be found; the loci are indicated. Now it is discovered that Paleozoic black shales containing up to 16 percent organic matter possess high concentrations of the three radioactive elements; excellent correlations exist between their contents in individual shale formations. On the other hand, pure limestones and pure quartz-sands exhibit practically no measurable radioactivity. These studies have resulted in a new method for the routine determination of uranium, thorium, and potassium. They also throw a new light on the evolution of petroleum source beds and on other problems. - V. S.

7428. Belousov, V. V. Migration of Radioelements and the Development of the Structure of the Earth (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Sér. Géograph. et Géophys., Moscow, No. 6, 1942, pp. 298-317.

A new geotectonic hypothesis is briefly described. According to this hypothesis the main energy factor in geotectonogenesis is radioactive disintegration. Based upon the irregular centrifugal migration of radioelements connected with granitic intrusions, the geotectonic processes may be explained by measuring the thermal regime of the earth caused by deep migration of radioelements and by their redistribution within the earth. - Author's abstract, translated by W. A.

7429. Campbell, J. L. P. Checking Your cement Jobs with Radioactivity Logging. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 10, No. 1, 1944, pp. 24-26.

Radioactivity logging has been recently used to determine the distribution of cement in oil wells. This question may arise in well-completions necessitated by poor cementing or squeeze jobs. The cement must be mixed with carnotite. After such a cement is in place, its displacement and distribution behind the pipes are judged from accentuated anomalies or kicks appearing on the radioactivity log. The logging procedure is described. Before cementing is started in a well, a gamma-ray log is run to provide a reference curve and to define the formations through which the cement is to extend. This curve is more desirable than an electrical log because shales vary in gamma-ray intensities. The carnotite cementing is then carried out; instructions are given for this work. After the cement has hardened, a repeat gamma-ray curve is made. A comparison of the two logs reveals the actual location of the carnotite cement. For an example, the case of a well in which gun perforations were squeeze-cemented is discussed and illustrated by samples of the two logs. Carnotite is hydrous potassium uranyl vanadate ($K_2O.2U_2O_3.V_2O_5.3H_2O$), a radioactive material used for the production of vanadium, uranium and radium salts. It is found in western Colorado and eastern Utah, mined as an ore, and ground to powder; the cost of this mineral is fairly low. - V. S.

7430. Conklin, G. M. Gamma-Ray Well Logging in Trinidad. Petrol. Interamer., Printed in Spanish and English, Tulsa, Okla., vol. 1, No. 2, 1943, pp. 42-48.

The Trinidad Leaseholds, Ltd., imported recently a radioactive well-logging unit of the Seismograph Service Corporation of Tulsa to Trinidad. The purpose was to locate cased-off sands, possibly containing oil. The present paper is concerned with the work in the southern geological province of Trinidad; this province comprises the Southern Range, the core of which is covered largely by Miocene deposits. The local geology is described; it has certain unusual features. Schlumberger electrical logging and core-sampling had been used in this region. The Seismograph Service Corporation equipment was put to work under favorable conditions; essentially the same technique and logging speeds were used as in the United States. Unexpectedly, it was discovered that the oil sands in Trinidad are more radioactive than the water sands (usually oil and water sands are not differentiated because both are insufficiently radioactive). The reason may be a lower porosity or a clay contamination of the oil sand, or else the oil may be slightly radioactive. If the latter were true, gamma-ray surveys would be very effective in Trinidad. The equipment, local field conditions, logging operations, and results of the survey are described. - V. S.

7431. Evans, R. D., and Goodman, Clark. Alpha-Helium Method for Determining Geological Ages. Phys. Rev., Lancaster, Pa., vol. 65, Nos. 7-8, 1944, pp. 216-227.

New techniques for determining the rate of helium production in igneous rocks by direct counting of the alpha-rays, combined with the removal and measurement of the helium accumulated in a rock specimen during geologic time, provide a direct physical method of helium age analysis which is free from complicated chemical manipulation, makes possible more rapid measurement of the helium and radioactivity of terrestrial materials, and has only a second-order dependence upon radioactive standards. Equations are derived which relate the true rate of production of helium to the observed rate of alpha-particle emission from a thin source. Age relationships are derived which allow a simple, but accurate, correction to be applied to the approximate age in obtaining the true age of geologically old materials, in which the decay of the parent radioactive elements has been appreciable. Intercheck radioactivity measurements have established the mutual reliability of the alpha-count method and the radon-thoron method of determining the total radioactive content of rocks and ores and have shown that there are no unknown, strong, alpha-emitting, radioactive elements in ordinary terrestrial materials. The agreement between the "alpha-helium" and "radon-thoron-helium" ages on the same samples indicates that the accepted decay constants of the parent elements, thorium and uranium, are correct to within the experimental uncertainty of the measurements (±5 to 10 percent). The application of the alpha-helium method to igneous rocks has revealed that certain mineral constituents allow a significant amount of their radiogenic helium to escape during geologic time. For this reason the revised helium time scale is based on measurements of selected retentive minerals, magnetite being one of the most promising. As a byproduct of these researches, the alpha-activity of 81 rock specimens has been found to range from 0.0 to 5.8 with an average of 1.23 alpha-rays per hour per milligram. - Author's abstract.

7432. Fritsch, V., and Forejt, H. (Exploration of Steeply Inclined Surfaces of Electrical Discontinuity Underground by Radio Prospecting.) Hochfrequenztechn. u. Elektroakust., Berlin, vol. 59, February 1942, pp. 41-45.

The principle of radio prospecting is described. Underground discontinuities are explored by measuring the changes in capacitance substituted in an oscillating circuit formed by an aerial, impedances, and discontinuous underground layer. A special bridge was developed for the purpose. The contact surface between permic and carbonic sandstone was determined by this method. - R.N., Sci. Abs., Sect. B, vol. 46, No. 551, 1943.

433. Gerling, E. C. Age Determination of Rocks and Minerals by the Helium Method (Abs.). Internat. Geol. Cong., 17th Sess., U.S.S.R., 1937; Abs. of Papers, Moscow, 1937, p. 194.

The helium method leads to an underestimation of the geological age f rocks and minerals, due to helium escape. The precision of this method an be gauged by means of helium diffusion or heat diffusion in a solid ody. In such diffusions, the transference of helium atoms occurs through he mediation of the atoms of the solid body. Observations showed for ranium a diffusion of the part of helium given off by the solid body. isturbances in the body, such as occur particularly in highly radioactive inerals, increase diffusion. The underestimation of age by the helium ethod has been demonstrated in the case of the ancient minerals and rocks f North Karelia. Helium escape from various minerals into vacuum at ifferent temperatures should be made the subject of study because it ests the fitness of the minerals for age determination. - V. S.

434. Khlopin, V. G. Oxygen Method for Geological Age Determination by Professor Lane (Abs.). Internat. Geol. Cong., 17th Sess., U.S.S.R., 1937; Abs. of Papers, Moscow, 1937, p. 193.

The limitations and advantages of the oxygen method for determining eological age are listed: (1) The method can be applied only to uranium inerals with a uranium content UO_2 at the moment of formation; (2) it s necessary merely to measure the quantities of UO_3 and UO_2 in the ineral at the moment of analysis; (3) the method cannot be applied to econdarily changed minerals and minerals containing water; and (4) the ethod may be used in conjunction with the lead method for several pur- oses which are indicated. - V. S.

435. Marble, J. P. Allanite (Orthite) as an Index of Geological Age (Abs.). Internat. Geol. Cong., 17th Sess., U.S.S.R., 1937; Abs. of Papers, Moscow, 1937, pp. 193-194.

The studies of Wells, Lokke, and the writer have shown that unmodified llanite (orthite) can serve as an index of geological age. For this etermination the lead method must be employed, as is done with other ranium and thorium minerals. The age measurement consists of analyses or lead, uranium, and thorium, and of radiographs for testing contami- ation by other minerals. The use of allanite much broadens the applica- ility of the lead method to problems of geological age. - V. S.

436. Permiakov, V. M. The Determination of Geological Age of Minerals and Rocks by the Lead Method (Abstract). Internat. Geol. Cong., 17th Sess., U.S.S.R., 1937; Abs. of Papers, Moscow, 1937, p. 194.

The determination of geological age by the lead method requires a easurement of very small amounts of lead. Fortunately, radioactivity

indicators provide an accurate means of measuring lead emanation from minerals and rocks. The use of these indicators makes it possible, moreover, to discover the most important sources of error. Therefore, measurements of lead emanation furnish the best method for detecting small quantities of lead. In the present investigation such determinations were made calorimetrically, and on the polarograph. The Khibine massif and the North Karelian formations were used for the determination of geological age. The probable age of Khibine lovchorites was found to be (360 ± 40) x 10^6 years; that of Karelian monazites, about (1,750 to 1,800) x 10^6 years. - V. S.

7437. Short, E. H., Jr. Use of Gamma-Ray Curves Increases Possibilities of Successful Work-Over. Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 45, 1944, pp. 85-87.

Gamma-ray logging is useful in working over completed wells. It serves to detect possible pay-horizons cased off during the original drilling. Such application has been made particularly on the Texas Gulf coast. Here the old fields - Barbers Hill, Thompson, and Conroe - were drilled before the introduction of electrical surveying. Thus, gamma-ray logging can furnish entirely new information. The typical recompletion technique used at the Conroe field is described. This well had been abandoned in 1932 and went dead in 1942. The only available record had been the driller's log. Before a gamma-ray survey was made, the well was mudded and tubing pulled. The log was run from 3,500 feet to total depth. A comparison between the driller's log and the gamma-ray log showed a vast difference in sand distribution; a thick shale break was discovered above 5,100 feet. As a result, the liner was gun-perforated, cement squeezed, plug drilled, etc. Immediately after this work, 167 barrels of oil were obtained daily. - V. S.

7438. Spatz, W. D. B. The Factors Influencing the Plateau Characteristics of Self-Quenching Geiger-Müller Counters. Phys. Rev., Lancaster, Pa., vol. 64, Nos. 7/8, 1943, pp. 236-240.

Investigations of factors influencing the starting potential and plateau slope of self-quenching G-M counters show: I. Impurities such as air or oxygen increase the plateau slope and starting potential of argon-alcohol counters. II. Operation of the counter causes changes in plateau characteristics as follows: (a) Immediately after use, the plateau slope increases slightly. (b) With continued use the plateau slope becomes steeper. (c) For moderate use the counter recovers when inactive, but never to the original characteristics. (d) With further use, the counter loses its plateau and does not recover. (e) The pressure in an argon-alcohol counter was observed to increase as a function of the total number of counts recorded. III. For argon-alcohol counters the useful life in these experiments was found to be about 10^9 - 10^{10} counts; for argon-methane, 10^7 - 10^8 counts. The observed changes of characteristics are presumably due to the decomposition of the organic vapor by the discharge. - Author's abstract.

439. Starik, I. E. Critical Survey of Radioactive Methods for the Determination of Geological Age (Abs.). Internat. Geol. Cong., 17th Sess., U.S.S.R., 1937; Abs. of Papers, Moscow, 1937, pp. 192-193.

Radium is so durable that it can be used for determining long and hort periods of geological time. Two groups of radioactive methods hould be distinguished: (1) Lead and helium - primary methods based pon the calculation of the time of radioactive decomposition itself; nd (2) aureole and oxygen - secondary methods based upon the effects roduced by radioactive rays; here time is calculated from the intensity f the rays' action. The necessary conditions and sources of errors in he more precise primary methods are discussed and classified. - V. S.

6. GEOTHERMAL METHODS

440. Flugge-DeSmidt. Mining Ventilation. South African Min. and Eng. Jour., Johannesburg, vol 53, May 16, 1942, pp. 283-287.

Reporting a geothermal gradient of 4°.62 F. per 1,000 feet and an bserved temperature of 100°.6 F. at 7,700 feet depth in virgin rock n the central rand which is close to values accepted for upper mine orkings. A discussion of numerous factors in mine ventilation and emperatures on wet and dry bulb thermometers for the limit of human omfort. Depths to which mining can be carried are dependent on the oove factors. - D. W., Mines Mag., vol. 33, No. 2, 1943.

7. GEOCHEMICAL METHODS

441. Berger, W. R. Geologic Significance of Oilfield Waters and Their Relationship to Structure and Production (Abstract). World Petrol., New York, vol. 15, No. 1, 1944, p. 58.

It is reported that a study of the chemical analysis of oil field aters has shown that in some geologic basins there is apparently a re- ation between the salt concentration of the water and the configuration f the basin. The total solids increase basinward and their amount is ess on structural highs than in adjacent synclines. The constituents ary sufficiently to allow inferences regarding structural areas and ossibly production of oil. Additional study might prove the relations hat are to be anticipated in many basins, thereby giving the oil indus- ry a new tool in oil exploration.

7442. Petraschek, W. Geochemische Bodenuntersuchungen, ihre Eignung für Kohle (Geochemical Depth Surveying; Its Applicability to Coal). Berg- und Hüttenm. Monatschr., Loeben, vol. 89, No. 1, 1941, pp. 3-4.

Discusses the question of the possibility that soil analysis might be used to trace the presence of coal as well as oil. - G.H.C., Annotated Bibliography of Economic Geology, vol. 14, No. 1, 1942, p. 134.

7443. Theodorovich, G. I. Oil Reservoirs of the Ishimbaevo-Sterlitamak Region. Compt. Rend. (Doklady) Acad. Sci. l'U.R.S.S., Moscow, vol. 34, Nos. 4-5, 1942, pp. 126-129.

The oil reservoirs of the Ishimbaevo-Sterlitamak region are made of carbonaceous rocks varying in their composition, porosity and other features; they were shown by the author to be associated with sulfur depositions in the overlaying strata (see Geophys. Abs. 7444.) The author now discusses these reservoirs with regard to their classification. He considers that from the point of view of oil recovery the basis of classification should be the oil-permeability of the reservoirs. Accordingly, the following classification is offered for this region: (1) reservoirs more or less uniformly permeable - porous and cavernous limestones and dolomites, 4 classes; (2) reservoirs of irregular and local permeability - porous and cavernous limestones and dolomites, 4 classes; and (3) fissured reservoirs permeable only along fissures - fissured dolomites and fissured limestones with caverns, 2 classes. - V.S.

7444. Theodorovich, G. I. Sulfur as a Guide in Prospecting for Oil (According to Evidence Obtained in the Region of Sterlitamak-Ishimbaevo). Compt. Rend. (Doklady) Acad. Sci. l'U.R.S.S., Moscow, vol. 34, Nos. 4-5, 1942, pp. 121-125.

The author seeks to settle the question as to how far the presence of sulfur may be considered an index to the occurrence of oil. From the data gathered in the region of Sterlitamak-Ishimbaevo it appears that the formation of sulfur in the strata overlaying certain oil deposits was caused at least partly by an upward migration of the gaseous components of the oil. Subsequently there occurred an oxidation of the oil gases, mainly of hydrogen sulfide, at the boundary between the upper (reduction) and the lower (oxidation) zone, whereby sulfur was formed. The presence of sulfur in association with bitumen is an even more reliable indication of commercial oil than of bitumen alone, for it shows that the original, deep-lying oil deposit is neither drained nor oxidized. If the rocks in the roof of an oil deposit and its gas cap are not disturbed, neither sulfur nor bitumens are found over the deposit. The observations on the occurrence of sulfur are described in some detail. They point to a number of concrete problems of oil exploration in the Sterlitamak-Ishimbaevo region. - V. S.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

445. Adler, J. L. Geophysical Exploration for Stratigraphic Oil Traps. Geophysics, Menasha, Wis., vol. 8, No. 4, 1943, pp. 337-347.

Stratigraphic traps are defined and classified, and the applicability f various geophysical methods for the discovery of each of the different ypes of stratigraphic traps is discussed. Some undeveloped techniques re suggested in this connection as subjects for research. - Author's bstract.

446. Biccard Jeppe, C. W. Rock-Pressure Problem. South African Min. and Eng. Jour., Johannesburg, vol. 54, part 2, No. 2640, 1943, pp. 15-19.

New information has been recently gained on rock pressure. Rocks ompress under pressure; confined rocks withstand higher pressure than nconfined; an excavation apparently produces a ring of pressures higher han existed heretofore; stresses in rock are unevenly distrubuted, nlike hydrostatic stresses; shearing is probably due to differential tresses; many physical properties of rocks, such as elasticity, change ith increasing stresses and affect the rate of propagation of seismic nd some electrical waves, as well as rock temperature, etc. Upon the asis of this information a new classification of bursts is offered and he theories of pressure-bursts are reviewed and evaluated. The pre- ention and prediction of pressure-bursts are discussed. Among the arious means of prediction are listed geophysical methods: (1) Measure- ents of changes of the velocity of seismic and electrical waves; and 2) measurements of changes of temperatures in boreholes drilled into ock masses. - V. S.

7447. Boots, P. H. A geophysical Survey of Kuwait, Persian Gulf (Am. Assoc. Petrol. Geol. Digest). Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 46, 1944, pp. 105-106.

In 1936-37 a geophysical survey was made in Kuwait, between Iraq and Saudi Arabia at the head of the Persian Gulf. Before this survey very scant geological information had been available. The survey used gravimeter and magnetometer for reconnaissance, and seismometer for fuller exploration; eventually the entire country was covered by a gravity survey. This combined work has led to the discovery of an oil-bearing structure which was drilled and proved to be a large oil field. The organization of the survey, the various local problems, and the unified coordination of methods are discussed in some details. - V. S.

7448. Brant, A. Geophysical Methods Have Role in Prospecting. Northern Miner, Toronto,Canada, Ann. No., 1943, sec. 4, pp. 52-53.

Geophysical methods are listed and their limitations are discussed. In the Canadian Precambrian the magnetic, self-potential, and resistivity methods are more generally practicable. Of these only the magnetic method is broadly useful. These applications should be widened. The author offers a program for a greater use of geophysics: (1) Regional geologic mapping should be made by central government and provincial bureaus; (2) prospecting parties should be provided with simple geophysical equipment and training; (3) research in geophysics and other phases of exploration should be organized in a central institute, in part supported by mining companies; and (4) all exploration results should be filed with the Mines Department for reference. Such a program must be accompanied by a simplification of geophysical methods and instruments, reduction of the cost and obtaining of results easily plotted. A portable, lightweight drill is particularly emphasized as a dependable and immediate test of field observations. The wide application of geophysics in standardized and accessible form can alone improve exploration. - V. S.

7449. Chiriboga G., Alfonso. Extensive Exploration Under Way in Ecuador. Petrol. Interamer., Printed in Spanish and English, Tulsa, Okla., vol. 1, No. 4, 1944, pp. 92-99.

Oil is found in Equador, mostly on the coast to the west of Los Andes. The producing oil pools are described with respect to geology, tectonics, and stratigraphic succession; at present the peninsula of Santa Elena is the only important producing region. The large potential oil deposits lay along the coastal belt and in the oriental region. (1) The coastal belt has numerous oil concessions. The most important are the concessions of the International Petroleum Co. north of the Santa Elena peninsula; they are being explored by geological and geophysical methods, as well as by aerial reconnaissance. (2) The region east of the Andes has the large oil concession of the Shell Oil Co. of Ecuador bordering Columbia. This company is doing aerial surveying, geological and geophysical exploration, and paleontological studies. The geology of this region is described. - V. S.

7450. Eckhardt, E. A. Average Number of Geophysical Parties Shows Increase Despite Draft. Oil Weekly, Houston, Tex., vol. 113, No. 4, 1944, pp. 17-18.

During 1943 geophysical exploration in the United States has increased 55 percent over the previous year, in spite of war drain on manpower (for exploration statistics of 1942 see Geophys. Abs. 113, No. 6942). A chart presents the progress of seismic and gravimetric prospecting month by month during 1937-43. It shows that the number of parties for both methods was in 1943 at the highest level ever achieved. Seismic work has mounted from an average of 226 parties in 1942 to an average

f 255 in 1943; in the first half of the year there was an average of 48 parties, and in August a peak of 270 parties was reached. The performance of parties was below par owing to difficulties in finding experienced men and giving them satisfactory transportation, housing, etc.; n appreciable number of the new men is of the predraft age. Another hart shows the distribution of geophysical exploration by states and he relative frequency of different methods in the U.S.A. Seismic work omposed 76 percent of total exploration; gravimetric work, 21 percent; agnetic work, 2 1/2 percent; and other methods, 1/2 percent. The chart s accompanied by a discussion of trends. The discovery rate has not ept in step with the increase in exploration. The remedy would seem to onsist in a better integration of the components of present exploration, or no new methods are in sight. - V. S.

7451. Fleming, J. A. Summary of the Year's Work, to June 30, 1943, Dept. Terrestrial Magnestism, Carnegie Inst. Washington. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 48, No. 4, 1943. pp. 207-213.

Geophysical research from July 1, 1942 to June 30, 1943, was curailed by the war. At least 95 percent of the services of personnel and ill of the laboratory, shop, observatory, and building facilities of the Department were devoted to investigations of war problems. Many organizaions and observatories, however, have maintained at least part of their programs, so that the loss of continuity in data is not serious. The reported activities are classed under the following headings: (1) Geomagnetic investigations; (2) terrestrial electricity; (3) ionosphere; (4) nuclear physics; (5) observatory and field work; and (6) special publications. These activities were mostly outlined in a previous report for the year April 1942 to March 1943 (see Geophys. Abst. 116, No. 7268); they have been generally continued. The present summary is more comprehensive than the preceeding one. - V. S.

7452. Gardner, D. H. Geophysics - Scientific Exploration for Oil. Electronics, Albany, N. Y., vol. 16, No. 3, 1943, pp. 136-137, 226-232.

The author discusses the part of electronics in geophysical exploration, as well as in production. Electronics is now applied to instruments used in most geophysical methods, such as gravitational, magnetic, seismic, electrical, and thermal. (1) Gravity meters employ electronic equipment in both the temperature-control apparatus and the gravity-sensitive and recording instruments. (2) Magnetometers of the inductor type can be operated both on land and under water, making surveys of varying terrain possible. (3) Seismic reflection methods are based upon a conversion of acoustic energy into electric energy, which is then passed to high-gain amplifiers and recording galvanometers. Particularly important in this equipment is the use of tubes and radio communications. The principles of reflection surveying are described in some detail. (4) Relection seismograph amplifiers, the radio equipment for transmitting

and recording, and other instruments make use of the vacuum tube. (5) Electrical methods measure the earth's natural potential, polarization effects, radio-field strength, etc. by means of apparatus made highly sensitive by electronic devices. (6) The gamma-ray logs, acoustic logs, mud-logs, etc., use the vacuum tube and the electronic-circuit technique. Remote control is employed in several geophysical methods. - V. S.

7453. Heiland, C. A. Geophysical Activities and Developments in Wartime. Petroleum, London, vol. 7, No. 3, 1944, p. 48.

An extract from Publication 103, Dept. of Geophysics, Colorado School of Mines. This publication is a reprint from Mining and Metallurgy, New York, 1943 (see Geophys. Abs. 112, No. 6822).

7454. Heroy, W. B. All Methods of Discovery Are Needed to Reverse Trend of Petroleum Reserves. Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 12, 1943, pp. 105-106.

From 1900 to 1925 the volume of proved reserves was generally near the current annual production, but for the period 1925-31 the volume of new reserves discovered substantially exceeded production. In 1930 East Texas was discovered, and for several years it overshadowed all other development. In 1932 and 1933 less oil was discovered than was produced. The advent of proration had a stabilizing action, and in the 1934-38 period 9,600,000,000 bbl. of oil was discovered and 5,800,000,000 bbl. produced. At the end of 1938 the total reserves were 17,400,000,000 bbl., or more than 14 times the 1938 production. Much of the rapid building-up of reserves was due to the application of geophysics, and in the latter part of the 1934-38 period an average of 250 geophysical crews were constantly at work. The reserves found in 1930 were about a third of those found in 1938. In 1940 nearly as much oil was found as was produced, but 1941 fell back to the 1939 level. It seems likely that the 1942 discoveries will provide reserves equal to about a half of that year's production. In this past period production was about 5,400,000,000 bbl.; and discoveries may not have exceeded 3,900,000,000 bbl., although at its end about 330 geophysical crews were in the field. 44 percent more wildcats were completed in 1941 than in 1937, and there was a corresponding increase in the number of successful wells and fields found. However, the size of the new fields fell from an average of 11,000,000 bbl. in 1938 to 2,000,000 bbl. in 1942. It seems probable that most of the structural traps containing important oil fields have been located, due to the efficiency of geophysics. At the present rate of wildcatting it seems that about 3,350 wildcats will be drilled in 1943, but with the existing volume of reserve added per wildcat, the discovery of a volume of oil equal to the current production would require 5,600 wildcats in 1943. P.A.W. has urged the drilling of 4,500 wildcats this year, hoping thereby to increase the number of random wildcats and to encourage the testing of the best available prospects. - G.D.H., Jour. Inst. Petrol., vol. 29, No. 240, 1943; Abstracts, pp. 425A-426A.

7455. Howard, W. V. Outline of Oil Possibilities of Shield Area of South America. Petrol. Interamer., Printed in Spanish and English, Tulsa, Okla., vol. 1, No. 4, 1944, pp. 78-84.

The shield-area of the eastern half of South America is usually supposed to have poorer oil possibilities than the cordilleran and sub-Andean areas. The author reviews the geological theories of the origin of the Brazilian shield. He points out that the revival of the Gondwana-land theory in modified form improves the chances for oil in eastern South America; the geological considerations favoring this view are discussed. The main promise lies in the marine intercalated beds, as exemplified at Comodoro Rivadavia. Therefore, exploration for oil will probably begin with stratigraphic tests. Further work will depend on local geology. (1) Where the lower Devonian and Pennsylvanian rocks are exposed, the search may be made by geological or geophysical prospecting for structure. (2) Where these rocks are overlain by later deposits, seismic surveying may locate bodies of these older beds by taking into account the interval between the glacial deposits and the basement rocks. (3) Where oil deposits are located in Tertiary beds, mostly covered by a blanket of continental deposits, a correlation of results obtained by stratigraphic tests may prove successful. - V. S.

7456. Kelly, S. F. Geophysicists, as Usual, Find Material for Discussion. Min. and Met., New York, vol. 25, No. 448, 1944, pp. 219-220.

The annual meeting of the American Institute of Mining and Metallurgical Engineers was held in New York City on February 21-23, 1944. The Geophysics Committee held two sessions. Hans Lundberg commented on last year's report by the Geophysics Education Committee and appealed for more training in field techniques. Carl Heiland pointed out the necessity of making courses in geophysics and geology more attractive to students; on the other hand, J. B. Macelwane and S. F. Kelly emphasized sound basic training. S. F. Kelly presented the paper by H. J. R. Way on resistivity prospecting for quartz veins in Uganda and the paper by J. G. Sineriz on exploring for water by electrical and seismic methods. L. W. Blau presented four papers by D. C. Barton in abstract. E. E. Rosaire discussed the future of oil prospecting; in this connection, Frank Rieber commented on the merits of the reflection seismograph. Finally, R. W. Moore set forth a new empirical method of interpreting earth resistivity measurements. - V. S.

7457. Krynine, P. D. Sediments and the Search for Oil. Min. Ind., State College, Pa., vol. 13, No. 3, 1943, pp. 1, 3-4.

Progress in any industry depends on the fruitfulness of its underlying principles. When these principles have outlived their usefulness, no amount of technological ingenuity will bring advances, and new basic principles must be discovered. Until lately the anticlinal theory was the basic principle in geophysical exploration for oil. It now becomes

apparent that this theory has largely served its purpose. The new principle must be sought in the petrology of sediments. The author has made a comparative study of oil fields in their relation to three classes of sediments - quartzites, graywackes, and arkoses. He concludes that each preferred type of mineral composition must be directly related to a certain preferred texture and structure; further, to a certain preferred type and size of sedimentary body; and, finally, to a certain definite type of oil fields. His aim is to construct correlation tables showing the relation of all forms of sedimentary activity to oil formation and accumulation under the different stages of sedimentary evolution. Valid criteria should be thus found to serve as tools in oil finding. As a byproduct, this study is yielding considerable information on the petrography of oil reservoirs. - V. S.

7458. Oil News. Survey Parties Reported Thick in New Mexico. Albuquerque, N. M., vol. 19, No. 23, 1944, p. 1.

Seismograph, magnetometer, and gravimeter work in the Permian Basin is at the highest level in history. There are approximately 55 shooting crews in New Mexico and West Texas compared with a normal number of 20. Of these 55 crews, 35 are working the area with seismograph, the remaining 20 using magnetometer and gravimeter. It is reported that companies contemplate sending 40 crews to Wyoming around April 1, with some of these expected to be drawn from the Permian Basin.

7459. Selsky, V. A. The Structure of the Earth's Crust according to the Data of Applied Geophysics (in Russian). Internat. Geol. Cong., Rept. of 17th. Sess., Moscow-Leningrad, 1937, vol. 4, Moscow, 1940, pp. 457-461.

A study of the earth's crust requires various geophysical data covering both the crust at great depth and the surface tectonics within a depth to 10 km. (1) Gravity data indicate conditions at great depth. They must correlate with surface tectonics to have a bearing on the upper crust. Such is the case of Meinesz' studies of negative anomalies in the Indian Ocean, the Malay Archipelago, etc. As regards positive anomalies, seismic phenomena indicate that in the deep water basins of the Gulf of Mexico, Caribbean Sea, etc. these anomalies would be connected with convectional currents in the substratum. (2) Magnetic disturbing bodies are affected by the general magnetic field of the earth. Since they exert influences on tectonics, they should likewise be considered. Such are the pre-Cambrian strata containing magnetic minerals. (3) Contemporary tectonic movements are to be studied through the distribution of epicenters of earthquakes, of isogons and isopors, and of gravity anomalies. These movements, as well as subcrustal movements, have directions. The existence of direction is indicated by the aggregation of geophysical anomalies along meridional and longitudinal lines. - V. S.

7460. Turechek, G. F. Determination of Bullet Velocity in Gun Perforators. Tommorrow's Tools - Today, Los Angeles, Calif., vol. 9, No. 2, 1943, pp. 12-13.

The velocity of a bullet is a factor closely related to the stability, penetration, and effectiveness which may be expected in the gun perforation of casing. The equipment used by Lane-Wells Co. for measuring this velocity is here described and illustrated. - Author's abstract.

7461. Wykoff, R. D. Geophysics Looks Forward. Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 46, 1944, pp. 85-90.

This presidential address at the annual meeting of the Society of Exploration Geophysicists has cautioned against underestimating existing methods and placing exaggerated trust in discoveries produced by the war. The present methods give diminishing returns because they seek structures associated with oil, not oil itself, and because they are used for re-working areas already explored in the past. These limitations render existing methods admittedly inadequate for meeting the growing demand. But a review of the basic scientific principles applied in geophysical exploration shows that no revolutionary improvements can be expected from them. At this same time, no new basic principles are likely to come out of the war. The recent advances in geophysical exploration were due to perfected instruments and to competent and resourceful personnel. These factors will remain the chief promise of geophysical progress. - V.S.

9. NEW PUBLICATIONS

7462. Archibald, R. A. (Editor). Mathematical Tables and Aids to Computation, a Quarterly Journal. Washington, D. C., Nat. Research Council of the U. S. A., 1943 -.

The Committee on Mathematical Tables, National Research Council, has started the publication of a new quarterly journal, Mathematical Tables and Aids to Computation (MTAC). R. A. Archibald, chairman of the committee, is the editor. This journal meets an urgent need, because some tables do not merely facilitate work but are indispensable for it; such are tables of the gamma function, of the probability integral, etc. The nature of the journal can be surmised from the first two issues published. The first issue contains notices of 88 tables printed during the last 10 years, detailed reviews of some of them, notices of errors found in the published tables, notices of manuscripts of unpublished tables, and a section of queries and replies. The second issue gives, moreover, an essay on trigonometrical tables in nonsexagesimal arguments, including time. The journal will deal likewise with mechanical aids to computation. - J.H.A., London, Edinburgh and Dublin Philos. Mag. and Jour. Science, vol. 34, No. 238, 1943, p. 794; condensed by V. S.

7463. Boletin de Informaciones Petroleras (YPF). El Mapa geológico del País (The Geological Map of Argentina). Buenos Aires, vol. 20, No. 229, 1943, p. 17

The Administration of Government Oil Fields (YPF) is publishing a geological map of Argentina, scale 1 : 2,000,000. The second section has been printed. It covers the area west of the 62th meridian, between the 32th and 42th parallels; namely, San Luis, Mendoza, Pampa, Neuquen, Rio Negro, and part of Buenos Aires. The data are provided jointly by the YPF and the Administration of Mines and Geology. - V. S.

7464. Bruhns, K. C., Ed. A New Manual of Logarithms to Seven Places of Decimals. Chicago, Ill., C. T. Powner Co., P. O. Box 796, 1944, Revised ed., 610 pp. Price $2.49.

This new manual of logarithms differs from Köhler's Handbook by certain abridgements and expansions. It comprises, namely: (1) Briggs' or common logarithms of the natural numbers from 1 to 100,000 and the auxiliary trigonometrical functions S and T for the calculation of the logarithms of sines, tangents, and cotangents of the angles from 0 to 10,000 seconds, etc.; (2) logarithms of the trigonometrical functions from 0° to 6° and 84° to 90° for every second; and (3) logarithms of the trigonometrical functions from 6° to 84° for every 10 seconds. - V. S.

7465. Carnegie Institution of Washington. Yearbook 41, July 1, 1941 - June 30, 1942. Washington, D. C., 1942, 309 pp.

In Yearbook 41 of the Carnegie Institution two sections are devoted specifically to geophysical work. (1) Geophysical Laboratory, report by L. H. Adams: The laboratory has undertaken defense research. Most of this work is organized into a single unified program; the remainder is made under special contracts. Some peacetime investigations were completed and prepared for publication; a review of them is appended. (2) Department of Terrestrial Magnetism, report by J. A. Fleming: The Department has continued work on measures of geomagnetic activity, terrestrial electricity, ionosphere, nuclear physics, geomagnetism, observatory- and field-observations, and miscellaneous activities. The publication of "Carnegie" data is announced. A bibliography is appended. - V. S.

7466. Comrie, L. J., Editor. Barlow's Tables. New York, Dover Publications, 1941, Price $2.49.

The latest edition of Barlow's tables contains square, cube, square root of 10 n, cube root and reciprocal, for every interger from 1 to 12,500. Constants are given to 15 places. - V. S.

467. Congrès Mondial due Petrole, 2-ème, Paris, 14-19 Juin 1937, Section Economique, Comité de la Nomenclature. Nomenclature des Termes Techniques de l'Industrie du Petrole (Allemand - Anglais - Français). Mimeographed edition.

The second World Petroleum Congress, Paris, 1937, has published, nder the direction of Pierre Minard, a nomenclature of technical petroleum erms, German-English-French. The nomenclature covers various phases f the petroleum industry, such as units of measurement, geology, prospecting, and drilling. English serves as the basis of the alphabetical rrangement. - V. S.

7468. Jahnke, E., and Emde, F. Tables of Functions with Formulae and Curves. New York, Dover Publications, reproducing Teubner's 1938 ed. (Funktionentafeln), 400 pp., 200 ills. Price $3.50.

This handbook contains tables, formulas, and curves of the elementary and advanced mathematical functions. It is prepared for the use of mathematicians, physicists, engineers, etc. The present enlarged and revised English text covers sine, cosine, and log integral; factorial function; error integral and related functions; theta functions; elliptic integrals; elliptic functions; elementary transcendental equations; Planck's radiation function; Legendre functions; Bessel functions; the Rieman-Zeta function; confluent hypergeometric functions; Mathieu functions; cubic equations; exponential function; source functions of heat conduction; and circular and hyperbolic functions of a real and complex variable. Graphical representations of the functions is added to this edition. - V. S.

7469. Jenkins, O. P., and others. Geologic Formations and Economic Development of the Oil and Gas Fields of California. California Dept. Nat. Res., Div. Mines, Geologic Branch, San Francisco, Bull. 118, 1940-43, 773 pp. Price, $4.00.

A compendium on the oil and gas fields of California has been prepared by 126 leading authorities of the subject. It constitutes one of the most important reference works on geology that has appeared in recent years. The present preliminary edition is published in four parts: Part 1, Development of the industry (including exploration), 1940; Part 2, Geology of California and the occurrence of oil and gas, 1941; and Parts 3-4, Description of individual oil and gas fields, Glossaries, Bibliography, and Index, 1943. - Van Tuyl, F. M., and Leroy, L. W., Bull. Am. Assoc. Petrol. Geol., vol. 27, No. 10, 1943, pp. 1393-1395; condensed by V. S.

7470. Miller, J. C. P. Tables for Converting Rectangular to Polar Coordinates. New York, Dover Publications, Price, 75 cents.

These tables are intended for use with a slide rule or computing machine. Only one set-up of the slide-rule or machine is necessary for each determination; no intermediate work needs to be recorded. The tabulation is made in increments of the argument of 0.001. A table for reducing angles to the first quadrant for angles from 0 to 9630 and from 0 to 224.6293 radians is included. The tables may be used for a transformation of harmonic constants in Fourier series expansions, for the magnitude and direction of a vector from rectangular components, for the modulus and phase of complex numbers when given in Cartesian form, etc. - V. S.

7471. National Oil Scouts and Landmen's Association. Oil and Gas Field Development in United States, Yearbook 1943. Austin, Tex., vol. 13, 1943, 789 pp. Price, $7.50.

This yearbook includes a review of geophysical exploration during 1942 in certain States and in the United States as a whole. The remaining information on geological work, land and leasing activities, wildcat exploration, oil and gas production, pipe lines, etc. is supplemented for this year by a comprehensive introduction and appendix presenting articles on various aspects of the oil industry. (A review is given by W.A. Ver Wiebe in the Bulletin of the American Association of Petroleum Geoligists, vol. 28, No. 1, 1944, pp. 127-128.) - V. S.

7472. National Research Council. Transactions of the American Geophysical Union, 24th Annual Meeting, April 23 and 24, 1943, Washington, D. C., parts 1-3. Washington, 1943-44; part 1 : 330 pp. part 2 : 783 pp.; part 3 : 99 pp. Total price $8.50.

The Transactions of the American Geophysical Union for the year 1943 are issued in three parts. Part 1 contains the proceedings of the General Assembly and of the Sections of Geodesy, Seismology, Meteorology, Terrestrial Magnetism and Electricity, Oceanography, Volcanology, and Tectonophysics. Many reports and papers of these Sections are of direct interest to exploration-geophysicists. Parts 2 and 3 contain the proceedings of the Section of Hydrology and the proceedings of the joint regional meeting of the Section of Hydrology and the Western Snow-Conference. Nonmembers wishing to purchase the Transactions should address orders, with checks payable to the American Geophysical Union, to General Secretary, American Geophysical Union, 5241 Broad Branch Road N. W., Washington 15, D. C., U. S. A. - V. S.

-73. Singewald, Joseph T., Jr. Bibliography of Economic Geology of South America. Geol. Soc. America, New York, Special Paper 50, 1943, 159 pp.

This publication is a sequel to bibliography contained in the book f B. L. Miller and J. T. Singewald, Jr., The Mineral Deposits of South merica, 1919. It adds 1,852 titles to the previous 1,060 titles. The ountries covered are Argentina, Bolivia, Brazil, Chile, Colombia, cuador, the Guianas, Paraguay, Peru, Uruguay, and Venezuela. Since 1919 here has been a marked increase in the investigation of mineral deposits n Brazil, Argentina, Bolivia, and Colombia. On the other hand, there as a decline in Chile and Peru. - V. S.

474. van Tuyl, F. M., and others. Review of Petroleum Geology in 1943. Colorado Sch. Mines Quarterly, Golden, Colo., vol. 39, No. 2, 1944, 127 pp. Price, $1.00.

This annual review is the second in a series inauguarated by the merican Association of Petroleum Geologists. The series purports to nform the workers in the petroleum industry about the new developments nd trends in geology, geophysics, and petroleum engineering. In the resent review an effort is also made to predict both the short- and ong-term trends in petroleum exploration in the light of the current ituation and probable postwar developments. Directly dealing with eophysics in this volume are the following papers: (1) New Developments n training of geologists and geophysicists; (2) developments in geo- hysics; (3) progress in geochemistry and geobiology; and (4) trends n petroleum geology and geophysics. Related to geophysics are also apers on new petroliferous provinces in the United States, unsuspected eologic conditions, discovery of deeper pays, etc. An extensive biblio- graphy of maps and literature is appended. - V. S.

10. PATENTS

7475. Well Surveying Device; R. G. Piety, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,333,883, issued November 9, 1943.

Apparatus for electrically logging a borehole comprising a source of electrical potential, an elongated electrode connected to one side of the source and extending into the borehole, a pair of coils adjacent one another and in flux linkage relation with the elongated electrode, a grounded electrode connected to the other side of the source, means for measuring the total current in the elongated electrode, and means for measuring current in the coils. - Claims allowed, 2.

7476. Subsurface Prospecting; D. G. C. Hare, Houston, Tex., assignor to Texaco Development Corporation, New York, N. Y., a corporation of Delaware. U. S. Patent 2,334,262, issued November 16, 1943.

The method of investigating the formation surrounding a borehole having a mud sheath on the walls thereof which comprises lowering through said hole simultaneously two sources of highly penetrating particles, one of said sources being surrounded by a material capable of slowing down the particles emitted from the surrounded source so that their penetration will not exceed substantially the thickness of said mud sheath, following each of said sources with a device for detecting particles emitted from said sources and returned to the holes after being scattered in the material surrounding the hole, and observing the difference in the relative number of particles registered by said detecting devices at different depths in the hole as the sources and detecting devices are lowered or raised through the hole. - Claims allowed, 3.

7477. Geochemical Prospecting Method; Stephen A. Kiss, New York, N. Y., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,334,269, issued November 16, 1943.

In the method of geochemical prospecting for subsurface petroliferous deposits in which soil gas is recovered from the soil and analyzed for constituents indicative of the proximity of such deposits, the step preliminarily treating the soil with a water soluble organic wetting agent, whereupon such constituents not otherwise readily removed from the soil are freed therefrom for collection and analysis. - Claims allowed, 4.

7478. Determination of Magnetic and Electrical Anisotropy of Formation Core Samples; Lyle Dillon, San Gabriel, Calif., assignor to Union Oil Co. of California, Los Angeles, Calif., a corporation of California. U. S. Patent 2,334,393, issued November 16, 1943.

A method for determining the magnetic anisotropy of earth core samples comprising subjecting said core sample to the magnetic field from a high-frequency pulsating electric current, varying the angular position of said core sample with respect to said magnetic field and correlating the relative changes in the character of said current effected thereby with the varied angular positions of said core sample, and determining therefrom the axis of minimum and maximum magnetic permeability. - Claims allowed, 10.

7479. Seismic Surveying; R. L. Klotz, Jr., Hazleton, Pa., assignor to Hercules Powder Co., Wilmington, Del., a corporation of Delaware. U. S. Patent 2,334,414, issued November 16, 1943.

In the process of seismic surveying which comprises positioning an explosive charge in the lower portion of a borehole, firing said charge and recording seismic waves therefrom, the step of positioning a column

detonating explosive having a diameter less than one-half inch throughat a substantial length of the said borehole and detonating this column detonating explosive approximately simultaneously with the detonation the said explosive charge whereby connections between the explosive harge and the surface of the ground are destroyed. - Claims allowed, 11.

480. Method and Apparatus for Investigating Earth Formations Traversed by Boreholes; Aimé Claudet, Mattoon, Ill., assignor, by mesne assignments, to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,334,475, issued November 16, 1943.

A method for investigating earth formations traversed by a borehole omprising the steps of directing radiant energy in the ultraviolet-nfrared band of the spectrum to the formation in place at a given depth n the borehole and obtaining indications of the effects produced by the adiant energy impinging thereupon. - Claims allowed, 28.

481. Method and Apparatus for Determining the Electrical Characteristics of Geological Formations Traversed by Drill Holes; J. J. Jakosky, Los Angeles, Calif., assignor to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,334,491, issued November 16, 1943.

A method for determining the character and thickness of the strata n a geological formation traversed by an uncased drill hole, which omprises: passing an electric current through the strata adjacent the rill hole in a direction along and substantially parallel to the bedding lanes of the strata, while determining the relative values of said current nd of the accompanying electrical potential between two spaced points within he path of such current flow at least one of which points is within the rill hole adjacent said strata; and repeating the steps of passing such urrent and determining said relative values, with the current flowing hrough strata at different depths. - Claims allowed, 25.

482. Magnetic Surveying Apparatus; E. P. Harrison, Barkingside, England, assignor of one-third to Arthur J. Hughes, Chigwell Row, Essex, England, and one-third to Henry Hughes & Son, Ltd., London, England. U. S. Patent 2,335,117, issued November 23, 1943.

A magnetic surveying apparatus comprising balancing means having two irms including similar conductors of high permeability, a third arm inluding an adjustable impedance and a fourth arm including a fixed nonferromagnetic resistance comprising two metal strips of substantially the ame resistance at a given temperature and wound together inductively, the mpedance temperature coefficient of the combined metal strips being subtantially the same as the impedance temperature coefficient of each of aid high permeability conductors. - Claims allowed, 4.

7483. Method of Making Geophysical Explorations; L. F. Athy, Ponca City, Okla., and E. V. McCollum, Houston, Tex., assignors to Continental Oil Co., Ponca City, Okla., a corporation of Delaware. U. S. Patent 2,336,053, issued December 7, 1943.

A method of reflection seismic surveying for determining the velocity of travel of seismic waves from adjacent the surface of the earth through the earth to at least one reflecting stratum, including the steps of successively generating seismic waves at two separate sources spaced apart substantially as far as reflections can be recorded, receiving seismic waves generated at the first source after reflection from said reflecting stratum at seismometers located adjacent each of said seismic wave sources, receiving seismic waves generated at said second source after reflection from said reflecting stratum at seismometers located adjacent each of said seismic wave sources, measuring the time of travel of the seismic wave from the first source to the reflecting stratum and back to the seismometer located adjacent said first source, measuring the time of travel of a seismic wave from said second source to the reflecting stratum and back to the seismometer located adjacent said second source, averaging said times of travel, measuring the time of travel of a seismic wave from one of said seismic wave sources to the seismometer adjacent the other of said sources and determining the velocity of the travel of seismic waves from the travel times thus obtained. - Claims allowed, 41.

7484. Geochemical Prospecting; Leo Horvitz, Houston, Tex., assignor to E. E. Rosaire, Houston, Tex. U. S. Patent 2,336,176, issued December 7, 1943.

A method for treating a soil sample containing entrained or adsorbed normally gaseous hydrocarbons in conjunction with water for the recovery therefrom of a hydrocarbon-containing gas sample for analysis which comprises confining the soil sample in a closed system, subjecting the sample to evacuation and heating whereby entrained gases and moisture contained therein are evolved, condensing a substantial portion of the moisture contained in the evolved gas to thereby leave a residual gas for analysis which is drawn off from said system, and returning the condensate to the sample. - Claims allowed, 3.

7485. Apparatus for Seismic Prospecting; C. C. Stotz, San Pedro, Calif., U. S. Patent 2,336,198, issued December 7, 1943.

An apparatus for seismic prospecting comprising a microphone, an amplifier electrically connected to the microphone and adapted and arranged to amplify the sounds received by the microphone, a recording motor electrically connected to the amplifier, said recording motor including a movable coil, a stylus, means pivotally mounting said stylus, means connecting the stylus mount and the movable coil in the recording meter whereby movement of said coil is imparted to the stylus, a tape, means to pull said tape under the stylus at a regular and known speed, a

olarized pilot relay having an armature coil, a transformer, one coil
f said transformer being electrically connected to the armature coil,
he other coil of said transformer being electrically connected to the
mplifier, a variable resistance, said variable resistance being electri-
ally connected between the polarized relay and the coil of the recording
otor, a battery having its midpoint connected to the coil of the record-
ng motor, and relay contacts providing electrical connection with either
ole of the battery through said variable resistance, whereby movement of
he recording motor coil is controlled. - Claims allowed, 3.

486. Seismograph Amplitude Control; J. P. Woods, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,336,206, issued December 7, 1943.

A control circuit for thermionic tube amplifiers used for seismic
ecording, said circuit comprising a control tube, means for passing a
eating current through the filament of said tube, means for altering the
ntensity of said heating current substantially simultaneously with the
eginnings of a seismic recording period, whereby the temperature of said
ilament and the output current of said tube are caused to vary between
n initial and final value during said period of recording, and means for
pplying to said amplifier tubes a bias potential derived from said output
urrent. - Claims allowed, 2.

487. Geochemical Prospecting; Leo Horvitz, Houston, Tex., assignor to E. E. Rosaire, Houston, Tex. U. S. Patent 2,336,612, issued December 14, 1943.

A method of geochemical exploration for subterranean petroliferous
eposits which comprises collecting samples of soil at spaced points
n the area to be investigated at a depth several feet below the surface,
aid depth being sufficient to eliminate the effect of surface conditions,
nd subjecting the individual samples to an analysis for the determination
f the content thereof of substances soluble in an inorganic acid whereby
he contents so determined may be compared for the purpose of identifying
nomalously high values thereof. - Claims allowed, 5.

488. Geochemical Well Logging; Leo Horwitz, Houston, Tex., assignor to E. E. Rosaire, Houston, Tex. U. S. Patent 2,336,613, issued December 14, 1943.

The method of logging a well drilled for the production of a petrolife-
rous material which comprises collecting samples at spaced intervals along
a borehole, determining the total content of material soluble in an inorganic
acid in each sample, the samples collected being sufficient in number to
yield data showing the variation in total acid-soluble content with depth,
and correlating the contents so determined with the depth of the samples
whereby such correlation may be interpreted to predict the possible approach
to a petroleum deposit. - Claims allowed, 3.

7489. Method and Apparatus for Perforating Well Casing by Gunfire; G. F. Turechek, Los Angeles, Calif., assignor to Lane-Wells, Co., Los Angeles, Calif., a corporation of Delaware. U. S. Patent 2,336,819, issued December 14, 1943.

The method of forming a light-weight glass bottle or other glass container which comprises forming a charge of glass into a hollow parison suitable for further expansion to the contour and size desired for the container, applying a chilling influence to a predetermined portion only of the parison to intensify the cooling of that portion as compared with the cooling of the adjacent portions of the parison, and then blowing said parison to form the container desired. - Claims allowed, 4.

7490. Gravity Meter; D. H. Clewell, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,337,152, issued December 21, 1943.

A gravity-measuring device comprising a mass structure, means for pivotally mounting the mass structure for rotation in a vertical plane about an axis in substantially the same horizontal plane as the center of gravity of the mass structure, means for balancing the gravity moment of the mass structure which generates a torque r of such form that

$$\frac{dr}{d\theta} \ll mgr \; ; \quad \frac{d^2r}{d\theta^2} - \cong - mgr \text{ (approximately)}$$

where mgr is the gravity moment of the mass structure and θ is the angle of rotation of the mass structure, and means for varying the effective lever arm through which the balancing means acts upon the mass structure to displace the mass structure an amount sufficient to nul the instrument. - Claims allowed, 8.

7491. Well Logging; L. W. Blau, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,337,442, issued December 21, 1943.

A device for logging a well, comprising, in combination, a container, two pairs of electrodes arranged on the exterior of said container, a large condenser arranged in said container, a cable for suspending said container containing at least four insulated electrical conductors, a source of direct current connected to the upper ends of a pair of said conductor cables, the lower end of one said pair being connected to one of said electrodes; and to one side of said condenser, a switch arranged in said container to selectively connect the other side of said condenser to the lower end of the other of said pair of conductors or to an electrode, the other pair of cable conductors being in a circuit including the other two electrodes and a vacuum tube voltmeter. - Claims allowed, 1.

492. Process for Locating Valuable Subterranean Deposits; L. W. Blau, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,337,443, issued December 21, 1943.

A method for prospecting for oil which comprises, selecting samples f soil at laterally spaced points over an area to be investigated remote rom the oil sought for and examining these samples under ultra violet ight whereby the relative fluorescence of such samples may be correlated ith sample locations to yield data useful in determining the location of he oil sought for. - Claims allowed, 1.

493. Well Logging; J. J. Heigl, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,337,465 issued December 21, 1943.

In a method for logging oil wells in which drilling mud discharged rom the oil well is examined for oil shows, the steps which comprise ixing said mud with a solvent for petroleum oil which does not fluoresce nder ultraviolet light and is not miscible with water, separating the olvents from the mixture whereby an extract is formed, passing ultraviolet ight through the extract, and measuring the intensity of the fluorescent ight emmited from the extract. - Claims allowed, 1.

494. Well Surveying Instrument; H. G. Doll, Houston, Tex., assignor to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,338,028, issued December 28, 1943.

A well surveying instrument for use with a multiconductor cable comprising a casing adapted to be lowered into a borehole, a plurality of conductors extending through the casing, means in the casing for providing indications of the inclination of the borehole, means in the casing including a movable light sensitive record strip for obtaining a photographic record of said inclination indicating means, a motor in the casing and connected in series with one of said conductors for moving said record strip, a switch in the casing, having a contact member adapted to be actuated in accordance with the displacement of said record strip to engage either of two contacts selectively, said contact member and one of said contacts being connected in the circuit of another of said conductors, and electrical illuminating means in the casing connected to said other switch contact and to a third of said conductors. - Claims allowed, 7.

7495. Well Surveying Apparatus; H. G. Doll, Houston, Tex., assignor to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,338,029, issued December 28, 1943.

In apparatus for obtaining indications of the inclination of a bore-hole, which apparatus includes a casing adapted to be lowered into a

borehole, a movable record strip in the casing and an electrical motor for moving said record strip, the combination of a source of electrical energy at the surface, a circuit including a single conductor cable connected to said source and motor, first switching means at the surface for opening and closing said circuit, and second switching means in said casing and adapted to be actuated by the record strip after predetermined displacements thereof for connecting said motor in said circuit, when said first switching means is actuated to close said circuit, to give the record strip a predetermined displacement and for disconnecting said motor from the circuit after said displacement has taken place. - Claims allowed, 8.

7496. Geochemical Prospecting; Leo Horvitz, Houston, Tex. U. S. Patent 2,338,643, issued January 4, 1944.

A method for geochemical prospecting in which soil samples are collected and subjected individually to a treatment to liberate therefrom a gas sample which is analyzed for its hydrocarbon content, the step of treating each soil sample for the purpose of liberating a gas sample therefrom with an aqueous solution of an inorganic salt having an acid reaction and an inorganic acid. - Claims allowed, 6.

7497. Magnetic Well Logging; J. C. Arnold, Los Angeles, Calif., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware. U. S. Patent 2,338,991, issued January 11, 1944.

An apparatus for logging well bores, comprising: a housing adapted to be lowered into a well bore; highly permeable elements arranged longitudinally therein; coacting pole pieces associated with said permeable elements and defining therebetween a gap, the permeable elements and pole pieces being so arranged that the magnetic field embraced by said elements is concentrated across said gap; a magnetizable wire in said gap; means for moving the wire past the pole pieces; means for moving said housing along a well bore; and a device for correlating the movements of said means. - Claims allowed, 4.

7498. Radiological Method for Surveying Wells; M. M. Albertson, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,339,129, issued January 11, 1944

A method of determining the permeability of the various strata penetrated by a borehole, comprising the steps of incorporating with the drilling fluid used in drilling the borehole a nonradioactive salt of a metal and a radioactive salt of the same metal, said salts being soluble in said fluid, the concentration of the second salt being extremely small as compared with that of the first salt, and subsequently using an electronic method to determine the concentration of the radioactive salt along the borehole. - Claims allowed, 2.

7499. Geochemical Prospecting; D. S. Rearden and E. G. Brewster, Los Angeles, and R. T. Sanderson, Sierra Madre, Calif., assignors to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,339,651, issued January 18, 1944.

Apparatus for sorbing soil gas from a gas-collecting zone comprising a conduit made up in a plurality of separable sections, one terminal section of said conduit being adapted for disposition entirely within said zone and to collect the soil gases therefrom, means associated with the conduit for sealing the gas-collecting zone from the atmosphere when said terminal section is disposed in said zone, at least one of the sections of the conduit near said terminal section containing a solid soil gas purification reagent, one of the other sections, further removed from said terminal section, containing a sorbent for soil gas, means for separately maintaining the reagent and sorbent in their respective sections, and means disposed in said conduit for inducing positive flow of soil gas from said zone, through said terminal section, the solid soil gas purification agent, the sorbent for soil gases and to the atmosphere. - Claims allowed, 5.

7500. Apparatus for Recording Seismic Waves; M. D. McCarty, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,340,272, issued January 25, 1944.

An electric seismograph comprising in combination, means for creating seismic waves in the earth at a point substantially below the surface, a conventional geophone spread, amplifiers for each of the geophones, and a multiple element recorder for recording signals generated by the geophones in the spread, an additional geophone located on the earth's surface directly above the point where the waves are created in the earth, means for recording signals generated by the last mentioned geophone on the same recorder element as signals from a geophone in the spread, means operable by an element of the blasting machine for rendering this geophone inoperative a predetermined time after the creation of the seismic waves but before seismic waves have been detected by the geophones in the spread whereby vertical wave velocity data as well as all of the data that is required from a single geophone spread when shot in one direction can be recorded on a single seismogram. - Claims allowed, 3.

7501. Method for Seismic Surveying; E. M. Shook and R. W. Olson, Dallas, Tex., assignors by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,340,275, issued January 25, 1944.

A method of recording a plurality of seismic data on a single trace of a seismogram that comprises the steps of detonating an explosive charge in the earth's surface to create seismic waves, generating and recording on a trace of a seismogram a signal indicative of the instant of detonation, blocking additional signals that are generated in the

detonating circuit from the recording instrument so that they will not be recorded as secondary breaks, detecting the first impulse of waves which have traveled vertically upward from the explosive charge, recording the first impulse on the same trace with the signal that is indicative of the instant of detonation, blocking signals, which are generated by the geophone subsequent to the first impulse, from the recorder, detecting waves which have traveled directly from the explosive charge to a geophone in a conventional spread, recording these detected waves and subsequent reflections on the same trace with the first two mentioned signals. - Claims allowed, 3.

7502. Geological Exploration Apparatus; K. H. Evjen, assignor to Nordel Corporation, both of Houston, Tex., U.S.A. Canadian Patent 415,208, issued September 14, 1943.

The method of electrical prospecting which comprises passing a current having a predetermined frequency through the earth between two spaced points adjacent the surface of the earth, picking up the potential difference between two other points adjacent the earth's surface and lying within the field of influence of said earth current, deriving from said potential difference a measure of the electrical characteristics of the earth in the area under investigation and repeating the measurement at different selected frequencies below about 20 cycles per second to obtain a spectrum of the potential representing variations in characteristics of the earth's strata at various depths below the surface. - Claims allowed, 18.

7503. Geo-Electric and Seismic Apparatus. Theodor Zushlag, West Englewood, N. J., U.S.A., assignor to Hans Lundberg, Ltd., Toronto, Ontario, Canada. Canadian Patent 418,420, issued February 15, 1944.

Apparatus for determining the amplitude ratio and phase difference of sine wave electromotive forces of the same frequency comprising a plurality of sources of electrical waves of the same frequency which may differ in amplitude and phase, a nonreactive resistance network constructed and arranged to measure amplitude and phase comprising a plurality of nonreactive electrical impedances connected in series, respectively, with said sources, a plurality of similar electrical amplifiers connected in circuit with said impedances, and an indicating device connected in bridge relationship with said amplifiers. - Claims allowed, 4.

7504. Electrical Exploration Apparatus; D. S. Muzzoy, Jr.; and Robert Du Wayne Miller, both of Houston, Tex., U.S.A., assignors to Shell Development Company, San Francisco, Calif., U.S.A. Canadian Patent 418,747, issued February 29, 1944.

In a system of electrical exploration, a commutator circuit comprising arc discharge tubes, a source of direct current connected thereto, a source of controlled frequency voltage pulses connected thereto, grounded current

electrodes connected thereto, means for discharging said tubes by applying thereto said voltage pulses, whereby the direction of the current flowing between the current electrodes is reversed, and indicating device, grounded potential electrodes connected to the terminals thereof, and relay means actuated by said voltage pulses for reversing said connections in synchronism with the reversals of the current flowing between the current electrodes. - Claims allowed, 6.

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I. C. 7303

DECEMBER 1944

UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

INFORMATION CIRCULAR

GEOPHYSICAL ABSTRACTS 118

JULY - SEPTEMBER 1944

COMPILED BY

W. AYVAZOGLOU AND V. SKITSKY

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 118
JULY - SEPTEMBER 1944[1]

Compiled by W. Ayvazoglou[2] and V. Skitsky[2]

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FOREWORD

Geophysical Abstracts 1 - 86 were issued in mimeographed form by the ureau of Mines; Abstracts 87 - 111 were published in bulletins of the Geo- ogical Survey; Abstracts 112 - 117 were issued in mimeographed form by the ureau of Mines as Information Circulars 7256, 7257, 7267, 7273, 7285, and 292.

1. GRAVITATIONAL METHODS

505. Ballarin, S. Tabelle per il calcolo delle derivate seconde del potenziale relativo a settori di anelli clindrici omogenei (Tables for Calculation of the Second Derivatives of the Potential Referred to Uniform Cylindrical Ring Sectors). Geofisica Pura e Applicata, Messina, vol. 5, 1943, p. 1.

Two tables are given for the calculation of second partial derivatives f the gravity potential of masses resolvable into uniform cylindrical ring ectors concentric about the position of the station. Underlying theory and ossible applications are discussed. - V. S.

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[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7303".

[2] Physical science analytical editor, Bureau of Mines, U. S. Department of the Interior

7506. Closs, H. Beispiele von Kurven des Schweregradienten unter Berücksichtigung der Flankenverhältnisse in ausgewählten norddeutschen Salzstocktypen (Examples of Curves of the Gravity Gradient in the Light of the Character of the Flanks in Selected Types of North-German Salt Domes). Oel u. Kohle, Berlin, vol. 39, No. 6, 1943, pp. 141-148.

The author presents 10 examples of North German salt domes selected with a view to showing the advantages of torsion-balance measurements. The gravimeter and the seismic methods offer no substitutes for these advantages. The examples include the following salt-dome types: Simple slope, symmetrical wedge stump (Keilstumpf), assymetric wedge stump, flank mass skewed upward, wedge stump with a heavy cap, etc., and various modifications thereof. These types are described and discussed; drawings illustrate their structure. An additional example demonstrates the possibility of combining torsion-balance with other methods; it shows that certain data permit the identification of important parts of salt domes. The discussion of examples leads to the conclusion that the greatest caution must be exercised in the determination of gradient maxima and of the direction of slope. Even though directions may be distinctly indicated in some types of salt domes, in other types this may not be the case. The necessity of a sufficient number of torsion-balance stations is stressed. - V. S.

7507. Glangeaud Louis. Gravimétrie, tectonique fine et structure profonde de la bordure externe du Jura (The Gravimetry, Fine Tectonics, and Deep Structure of the Boundary of the Jura Mountains). Compt. rend., Paris, vol. 216, No. 20, 1943, pp. 671-673.

The distribution of Bouguer anomalies in the border zone of the Jura Mountains in France indicates the presence of several distinct deep-set structures. The broad characteristics of these structures are described. The zones of maximal surface folding generally coincide with the regions where Bouguer anomalies have their highest gradients. - V. S.

7508. Lagerquist, P. A. Increased-Sensitivity Astatic Pendulum Gravimeter for Observing Variations of Gravity with Time. Ark. Mat. Astr. Fys., Stockholm, 28A, vol. 1, No. 7, 1942, 20 pp.

An Ising astatic pendulum gravimeter is modified for laboratory use with the view to observing the diurnal variations of gravity. The ordinary difference method with visual observations gives results with a mean error of 2.5×10^{-2}mgal. A difference method using an unstable pendulum with specially designed automatic registration apparatus gives a mean error of 1×10^{-2}mgal. The gravimeters show variations of the expected order over a period of a few days. Further progress in increasing the sensitivity will come by better temperature control and stricter selection of site, and by using pendulum fibers of small secular creep. - A. Hu, Sci. Abs., London, vol. 47, No. 554, 1944.

509. Legge, J. A., Jr. A Proposed Least-Square Method for the Determination of the Elevation Factor. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 175-179.

The purpose of this paper is to present a least-square method whereby the elevation factor is determined by fitting a polynomial to the gravity profile. The method is applicable to stations located along a straight line as well as those located at random over an area. - Author's abs.

510. Lejay, Pierre. Nouvelles déterminations de la pesanteur dans le sud-est de la France (New Determinations of Gravity in the Southeast of France). Compt. rend., Paris, vol. 216, No. 2, 1943, pp. 105-106.

The results of measurements of gravity obtained at 87 stations in the Southeast of France are given in a table. - V. S.

511. Missouri Geological Survey. Gravimetric and Magnetic Maps of the State of Missouri. Rolla, Mo. Price, 50 cents for each map.

The State of Missouri has recently published gravimetric and magnetic maps of the entire State. The magnetic map is based on stations at intervals of 2 miles over the central and southern part of the State and at intervals of 1 mile over the northern part and the eastern and western edges of the State. The contour interval is 100 γ. These contours only (without station locations or values) are overprinted in red on the standard base map of the State at scale of 1:500,000. The magnetic map is a continuation of a magnetic map of the northwestern part of the state included in "The Geology of Northwestern Missouri," Missouri Geological Survey and Water Resources, vol. 25, 2d ser., 1938. The gravimetric map is based on gravimeter stations at intervals of approximately 5 miles along the main highways. Station locations and contours of Bouguer Anomaly at "Interval of 50 gravity units" are shown, also overprinted in red on the standard base map at scale 1:5,00,000. (The "unit" referred to here is 10^{-4} c.g.s. units, so the contour interval is 5 mg.) Gravity values at the individual stations are not indicated on the map and the basis of reduction (i.e., the density used) is not stated. The maps are available at a cost of $0.50 each from the Missouri Geological Survey, Rolla, Mo. - L. L. Nettleton, Geophysics, vol. 8, No. 4, 1943, p. 423.

7512. Noergaard, G. Un Gravimètre nouveau et des mesures à l'Ile de Bornholm (A New Gravimeter and Measurements on the Island of Bornholm). Tätigkeit balt. geodät. Kommission, 1938-1941, 1942, p. 31.

The author has developed a new gravimeter which operates without thermostats and other electrical devices increasing the weight of the apparatus. Gravity produces torsion of a quartz thread; the torsion moment is measured by means of an arrangement of mirrors. The average error does not generally exceed 0.2 mgl. The gravimeter is described. Tests of this instrument on

the island of Bornholm have shown that it is easily transported and can work in unfavorable weather. Tables of measurements and isogam maps are given. - V. S.

7513. Pariisky, N. N. An Investigation of the Time Variations of Gravity in the Caucasus (Abs.) Internat. Geol. Cong., 17th sess., U.S.S.R., 1937, Abs. of Papers, Moscow, 1937, p. 187.

The Seismological Institute of the Academy of Sciences of the U.S.S.R. has investigated the variation of gravity with time in seismic regions. The Caucasus was selected for this work. Values of gravity obtained in 1903-12 were compared with values obtained at the same stations in 1935-36. 14 stations were used, and 10 stations will be added thereto in further work. The old determinations had been made with Sterneck's pendulums, and they were recalculated; Tbilisi (Tiflis) served as the station of reference. The mean quadratic error of the differences of gravity was estimated for an interval of 23-32 years by the Borrass method; the variations of length of the pendulum and all systematic errors were taken into account. The results are presented in a table. The error ranges for different stations from 3.9 to 5.8 milligals. The differences of gravity values for 8 stations are less than, or equal to, this error; only for 2 stations do they reach 12 and 13 milligals. It is not yet possible to determine what part of the observed variations is caused by actual secular changes, but evidently these changes do not on the average exceed 2 or 3 milligals. - V. S.

7514. Razdymakha, G. S. A Centrifugal Gravimeter (in Russian). Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros'emki i Kartografii GUGK pri SNK SSSR, Sbornik No. 7, Issledovaniia po Gravimetrii, Moscow, 1941, pp. 3-28.

The pendulum gravimeter is precise, but its operations requires much care and time. The author offers a simpler gravimeter. It consists of a small cylinder filled with a liquid and rotated about its axis. The surface of the equilibrated liquid will be a paraboloid of rotation, the parameters of which change with the force of gravity and the velocity of rotation. By measuring the relative changes of some parameter, such as the focus distance, while knowing the angular velocity of rotation of the apparatus, it is possible to determine the relative value of the acceleration of gravity at a given place on the surface of the earth. The construction of such a centrifugal gravimeter has become possible due to the development by radiotechnique of generators with a high stability of axial rotation. The present paper analyzes the theoretical problems of construction, namely, the selection of a parameter of the paraboloid of rotation for measurement, the calculation of the power of the mechanism rotating the cylinder, the hook-up and calculation of the generator, the measurement of the temperature in the apparatus, the determination of the initial volume of the liquid, and the testing and calibration of the instrument. The mathematical solutions involve differential and integral calculus. Drawings illustrate the apparatus. - V. S.

515. Romberg, Frederick, and Barnes, V. E. Correlation of Gravity Observations with the Geology of the Smoothingiron Granite Mass, Llano County, Tex. Geophysics, Menasha, Wis., vol. 9, No. 1, 1944, pp. 79-93.

Gravitational observations were made, and the geology mapped, on the moothingiron granite mass in Llano County, Tex. The observed gravitational nomaly was interpreted to give depth and a subsurface shape for the mass. aps are provided showing the gravity contours and the geology, and geo- ogical and mathematical appendixes are added. - Author's abs. (A discussion y W. H. Bucher accompanies the paper).

516. Seismos Gesellschaft m. b. H. Bericht über die Ausfuhrung von Schweremessungen im Messgebiet Varna (Report on the Carrying out of Gravity Measurements in the Survey-District of Varna, Bulgaria). Jahrb. Bodenschätze Bulgarien, pt. A, vol. 1, 1941, p. 33.

The Seismos Co. reports on its gravimetric measurements in the region f Varna, Bulgaria. These measurements were completed in 1940. They overed an area of 560 km.^{2} and involved 197 stations. The findings are mbodied in a map showing isogams and structures. The gravity picture of he region is characterized by the following principal elements: (1) The ravity high of Momino; (2) the gravity break of Venelin - Aksakovo; (3) the ravity threshold of Varna; (4) the high axis of Varna- South Svezdice; (5) he high axis of Priselci Gor - Pliznak; (6) the hypothetical high of Galata; 7) the gravity decline southward; and (8) the minimum zone of Dobri-Dol. hese data are described. Westward from Momino's high lies the basin of rovadia with a salt dome, which was surveyed by torsion balance. The reatest geological importance from the standpoint of oil should be attached o the gravity break of Venelin - Aksakovo. - V. S.

7517. Shneiderov, A. J. The Exponential Law of Gravitation and Its Effects on Seismological and Tectonic Phenomena: A Preliminary Exposition. Nat. Research Council, Am. Geophys. Union, Trans. 1943, part I, Washington, D. C., 1943, pp. 61-88.

A new law of gravitation based on exponential interaction between matter nd the LeSagian field is proposed and expounded, and two new fundamental henomena - radional pressure of field on matter and radional compression f matter by field - are brought forward and explained. Two exponential formulas of gravitation are presented. The constitution of the earth as composed of definite layers, the ionization of which increases with their depth, and a gaseous electronic-atomic core of great elasticity and density are suggested, thus explaining nontransmittance of transverse vibrations by the core. Continuous expansion of the earth as a whole that goes on be- tween contractions is inferred to be the cause of (a) parallelism in oppo- sitely situated coasts, (b) "swelling" of ocean beds, (c) earthquakes, and (d) continuous morphological and tectonological changes in the earth's crust. Glacial periods are explained as a consequence of cataclysmic eruptions followed by reorientation of the poles and envelopment of the earth by a

dense "curtain" of dispersed volcanic substance. Sudden changes in the earth's surface noted by Suess as accompanying a formation of new continents, oceans, and mountain chains are explained to be the consequence of major contractions which interrupt the continual expansion of the earth and shrinking of the earth's crust after a cataclysmic eruption. The continual increase in the length of the day due to the earth's net expansion is found to be too small to be observed, unless in a considerable perspective of time, while the cyclical variation in the length of the day, due to planetary influence on the shape of the earth, is considered to be within the scope of observation. - Author's abs.

7518. Zamorev, A. A. Determination of the Form of a Body by the Derivatives of the External Gravitational Potential (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Ser. Geog. Geophys., Moscow, No. 1/2, 1942, pp. 48-54.

The writer has offered in a preceding paper a solution for the reversed problem of the theory of the potential for a two-dimentional case (see Geophys. Abs. 116, No. 7266). In the present paper, the preceding results are generalized in the light of new considerations. A basis is thereby gained for application of the theory of the potential to gravitational anomalies. It thus becomes possible to develop new methods for explaining these anomalies. In forthcoming articles the writer proposes to give practical examples. - V. S.

2. MAGNETIC METHODS

7519. Baird, H. F. Magnetic Declination in New Zealand for Epoch 1943.5. New Zealand Jour. Sci. and Technol., B. General Section, Wellington, N. Z., vol. 25, No. 4, 1944, pp. 175-178.

Preliminary maps of magnetic declination in New Zealand derived from the present resurvey are delineated for epoch 1943.5, based on computations made from 109 points recently occupied. It has been discovered that throughout the length of the Dominion marked differences exist in the rate of secular variation. Consequently, fairly frequent reoccupation of suitable stations is necessary. While the general trend of Farr's 1903-5 isogonals has been confirmed, serious errors arise if they are amended merely by extrapolating the amount of secular variation applicable to, and previously only known at, Christchurch. - Author's abs.

7520. Bitter, Francis. The Scientific Significance of Ferromagnetism. Jour. Washington Acad. Sci., Menash, Wis., vol. 33, No. 8, 1943, pp. 235-238.

The author deals with the scientific aspects of ferromagnetism. He reviews briefly the theoretical contributions of Ewing, Weiss, Curie, Heisenberg, Bloch, and Slater and the recent experimental work at the Massachusetts

nstitute of Technology. It is now known that ferromagnetism is due to lectrons that are neither so tightly bound to atomic cores as electrons n the lower energy levels nor so loosely bound as the conduction electrons. ecent experiments tend to emphasize that much more complicated phenomena xist that had been suspected. Accordingly, the next move is up to xperimentalists. - V. S.

521. Broughton, W. A. The Buckhorn Iron Deposits of Okanogan County, Wash.; Results of a Magnetic Survey. State of Washington, Div. of Geol., Rept. of Investigations 8, Olympia, Wash., 1943, 21 pp.

The building of dams at Bonneville and Grand Coulee has stimulated re-xamination of iron deposits in Washington. One of the studies, made in une-August 1942, dealt with the Buckhorn deposits. It consisted of a mag-etic survey with the Gurley dial compass and dip needle and covered the orth and east slopes of Buckhorn Mountain (Copper Mountain). The areas of agnetic attraction are listed and shown on a geological map. There are ight areas of extremely high dip-needle readings; they may indicate faulted egments of the ore body, individual bodies of magnetite due to irregular eplacement of the limestone, or merely sizable bodies of magnetite close o the surface; the accessory data essential for conclusive information are ncomplete. The report describes regional and local geology and iron-ore eposits and includes estimates of iron reserves. - V. S.

7522. Eblé, Louis. Differentes sortes d'agitation magnetique (Different Kinds of Magnetic Disturbance). Compt. rend., Paris, vol. 216, No. 9, 1943, pp. 305-306.

Photographically recorded curves of the constituents of the terrestrial magnetic field or of declination usually show no regularity. It is possible to observe on them pulsations, loops, hooks, "magnetic storms", etc. More-over, these disturbances show diurnal variations in intensity. The diurnal variation of average magnetic characters reaches a maximum during the night, a principal minimum in the morning, and a secondary minimum near 16 h. (4 p.m.). On the other hand, the diurnal variation of the hourly frequency of magnetic characters has the greatest frequency of weak disturbances near noon and the greatest frequency of strong disturbances early at night. This difference indicates that magnetic disturbance is really the product of at least two different components: (1) A short and rather regular disturbance developing mainly in the morning; and (2) a prolonged and irregular disturb-ance attaining its maximum at night. They are traceable to solar activity but have different immediate causes. The short disturbance is due to an immediate effect of the sun's ultraviolet radiations, while the long dis-turbance is due to a combined action of the ionosphere and of extraterrestrial currents. The observed diurnal magnetic variation results from their super-position. - V. S.

7523. Ehrenhaft, Felix. Magnetolysis and the Electric Field Around the Magnetic Current (Abs.). Phys. Rev., Lancaster, Pa., vol. 63, Nos. 11-12, 1943, pp. 461-462.

The author summarizes his experiments. Between the vertical cylindrical poles (magnetodes) of an electromagnet of soft Swedish iron, whose bases form a horizontal gap, acidulated water is decomposed into oxygen and hydrogen gas. As long as the two poles immersed in the solution are not magnetized, we get pure hydrogen. But when the two poles are magnetized, we get a mixture of hydrogen and oxygen. The amount of gases evolved magnetically is proportional to the magnetic field. Microscopic observation shows that magnetically evolved gas bubbles carry either a North or South magnetic charge. In the experiments, magnetolysis and electrolysis were superposed. After a swarm of positive electrically charged hydrogen bubbles are produced, the magnetodes are short-circuited electrically. Each of these positively charged gas bubbles moves in a circle around the gap between the magnetodes, through which a constant magnetic current flows, reversing its direction on reversion of the magnetic field. It does so exactly as a single magnetic pole would circulate around the constant electric current, reversing its direction with reversal of the electric field. The magnetic current is surrounded by circular electric lines of force. - V. S.

7524. Fleming, J. A., and Scott, W. E. List of Geomagnetic Observatories and Thesaurus of Values. IV-V. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, 1944, No. 1, pp. 47-52; No. 2, pp. 109-118.

Table 1, Annual Values of Geomagnetic Elements at Observatories, is continued in these issues (for parts I-III see Geophys. Abs. 114, 115, 117). - V. S.

7525. Herroun, E. F. A Comparison of the Magnetic Properties of Solid and Powdered Magnetites; with Observations on Coercive Force. Proc. Phys. Soc., London, vol. 55, pt. 4, No. 310, 1943, pp. 338-343.

Experiments were made with magnetites to determine the effects of powdering on their magnetic properties and coercive force. A number of magnetites of high, medium, and low coercivity were collected in different countries. For each magnetite, some samples were cut in the form of bars from the solid mineral. Other samples were reduced to coarse- and fine-grained powders. A part of the powdered samples was then formed into bars by mixing in a small quantity of a hot solution of photographic gelatin and compressing the substance; tests showed that such a procedure did not alter the properties of powders. Finally, the magnetic properties of solid magnetites and of powdered magnetites were measured and compared; they are tabulated. The results can be summarized as follows: (1) Permeability is much reduced by powdering; (2) maximum permeability is reached at higher forces with powders than with solids; and (3) coercivity is increased in magnetites of low initial coercivity, but decreased with those of high coercivity. Observations are also presented on the persistence of magnetic structure. - V. S.

7526. Johnston, H. F. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for October to December, 1943, and Summary for Year 1943. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 1, 1944, pp. 53-61.

Tables and graphs are given with explanatory text. - V. S.

7527. Knapp, D. G., and Howe, H. H. Magnetic Observatory Results at Tucson, Ariz., for 1933-34; at Cheltenham, Md., for 1933-34; at Sitka, Alaska, for 1935-36; and at Honolulu, Hawaii, for 1935-36. U. S. Coast and Geodetic Survey, Washington, D. C.; MO-15, 1943, 116 pp.; MO-17, 1943, 118 pp.; MO-18, 1944, 122 pp.; MO-119, 1944, 114 pp.

These publications contain extensive tables of observatory results, reproductions of magnetograms showing the more important magnetic storms, and an explanatory text. The tabulated results include hourly mean values of the magnetic elements D, H, and Z, summaries of their monthly and annual means, collected mean diurnal variations for each month, season, and year, lists of principal magnetic disturbances, amounts of noncyclic change, observed and adopted base-line values of D, H, and Z variometers with their abrupt changes, etc. The text includes a description of instruments, discussions of their coefficients and behavior and of the procedures used, and explanations of the various tables. - Author's abs.

7528. Lasareff, P. P. Contemporary Problems of the Earth's Magnetism (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Série Géog. et Géophys., Moscow, No. 1, 1943, pp. 29-40.

Problems of dividing terrestrial magnetic fields into normal and abnormal are discussed. Investigations of rocks from which values of a geomagnetic field at a given point may be obtained, and experiments with models by the use of which the connection between the normal and abnormal fields may be studied without mathematical calculations, are described. A method for determining the magnetic field of the earth at a fixed epoch is examined. Physical theories of geomagnetism are briefly outlined. - Author's abs., translated by W. A.

7529. Maurain, Charles. Sur les perturbations magnétiques à début brusque dans la région parisienne. Repartition annuelle et diurne des débuts brusques (The Magnetic Disturbances with Sudden Onsets Observed in the Region of Paris. Annual and Daily Distributions of Sudden Onsets. Compt. rend., Paris, vol. 217, No. 1, 1943, pp. 8-10.

Magnetic disturbances with sudden onsets (SC) were studied on the basis of the observations of the central French magnetic station near Paris. 350 typical cases were selected from the material for the last 60 years. The annual distribution of SC by months showed that they are more frequent in summer than in winter; the maximum frequency occurs in March and April;

minimal frequency, in November and December. The daily distribution of SC by hours showed that they are most frequent at 2-3 p.m. and least frequent at 8-9 a.m. The annual variation of the amplitudes of SC is found to correspond to the annual variation of the frequencies of SC; similarly, the daily variation of the amplitudes of SC corresponds to the daily variation of the frequencies of SC. The variation of amplitudes was studied for the horizontal component H where the amplitudes are larger than for the components Z and D. - V. S.

Missouri Geological Survey. Gravimetric and Magnetic Maps of the State of Missouri. Rolla, Missouri. Price, 50 cents for each map. (See Geophys. Abs. 7511.)

7530. Rougerie, Paul. Sur la distribution et la variation séculaire de l'aimantation terrestre (On the Distribution and the Secular Variation of Terrestrial Magnetization). Compt. rend., Paris, vol. 216, No. 12, 1943, pp. 416-418.

This study is based on the data collected during the International Polar Year 1932-33. The author computed G (the local magnetic constant of L. A. Bauer) for 65 magnetic stations and obtained an average value $G_m = 0.30821$ gauss closely approximating Bauer's theoretical value $G = 0.31089$. The magnetic constant G increases from the poles to the equator; in the northern hemisphere this increase is about 200 γ per degree of latitude. The author then determined the trend of the secular variation of G according to the data of some 30 observatories (the distribution of the earth's magnetization had been shown by Nippoldt, Bauer, etc., to be essentially constant during 1910-33). The results indicated that the change in the trend of the variation reported by Maurain and Madinhac exists only at stations in Europe and continental Asia. At other stations G showed either a continuous increase (India, China, Japan) or else a continuous decrease (America, Australia). These findings show that the magnetization of the earth is a complex phenomenon and that the field of secular variation is assymetrical. - V. S.

7531. Schwartz, G. M. Tracing the Duluth Gabbro Contact with a Magnetometer. Econ. Geol., Lancaster, Pa., vol. 39, No. 3, 1944, pp. 224-233.

The contact at the base of the Duluth gabbro was traced for 50 miles where it is thickly covered with glacial drift. The rapidity with which this was done with a Schmidt-type vertical magnetometer suggests that such methods are useful in reconnaissance as well as in detailed work. General methods and results are summarized. - Author's abs.

7532. South African Mining and Engineering Journal. Magnetic Methods in Mining Practice: Uses in Prospecting and Separation. Johannesburg, South Africa, vol. 54, pt. 2, No. 2661, 1944, pp. 517, 529.

Felix Ehrenhaft considers that he can produce magnetic ions and prove the existence of magnetic currents. These discoveries, if substantiated, would revolutionize science. The author describes various practical utilizations of magnetic properties with a view to showing the potentialities of Ehrenhaft's discoveries. He deals briefly with mining practice, prospecting, civil engineering, magnetic separation, and industrial processes; examples are cited. Magnetic prospecting depends on the magnetic properties of subsurface bodies. Iron ores and igneous and metamorphic rocks are strongly magnetic, while most sedimentary rocks are weakly magnetic. Oil is found indirectly, mostly by searching for igneous rocks potentially related to oil formations. The various instances of discoveries by magnetic prospecting are mentioned, the factors in rock magnetization are discussed, and different types of prospecting instruments are indicated. - V. S.

7533. Strona, A. A. Results and Problems of Magnetometric Study of the Pre-Cambrian in the European Part of the U.S.S.R. (in Russian). Internat. Geol. Cong., Rept. of 17th Sess., Moscow-Leningrad, 1937, vol. 4, Moscow, 1940, pp. 451-455.

The magnetic method is particularly well-suited for investigating the pre-Cambrian in European U.S.S.R. This method has already yielded many discoveries: (1) The Kremenchug, Nikopol, and Azov iron deposits were discovered, and the Krivoi Rog and Zheltaia Reka iron ore districts were expanded; (2) the Kola Bay, as well as the Ymandra and Onega regions within the Baltic shield, were found to contain iron ores; (3) the Kursk magnetic anomaly area was discovered to hold important iron deposits in the buried pre-Cambrian; and (4) numerous anticlinal structures covered by sediments and containing petroleum, gas, and helium were surveyed by the magnetic method. Some other examples are cited. These successes justify the conclusion, the author believes, that magnetometry should be assigned a leading role in the study of the pre-Cambrian in European U.S.S.R. - V. S.

7534. Terrestrial Magnetism and Atmospheric Electricity. Notes: Magnetic Survey of American Republics. Baltimore, Md., vol. 49, No. 1, 1944, p. 69.

Two magnetic field parties of the United States Coast and Geodetic Survey are in the American republics carrying on a program of repeat-station observations in cooperation with the governments of the countries concerned. This program is an extension of the program of 1941-43. One party is in Central America, the other in South America.

7535. Vestine, E. H. The Geographic Incidence of Aurora and Magnetic Disturbance, Northern Hemisphere. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 2, 1944, pp. 77-102.

This paper is concerned mainly with the variation with geographic position of the average daily frequency of aurora in high latitudes, and of geomagnetic disturbance. As regards geomagnetic disturbance, curves of equal disturbance are given. They were obtained as the average maximum

range in total force of the disturbed days of the polar year, 1932-33. The directions of the disturbance vectors at the time of morning minimum at each station were first used to adjust stations in geomagnetic latitudes 62° to 71° north to a circular auroral zone in latitude 67° north, thus obtaining the latitude distribution of the disturbance daily variation relative to this circular auroral zone. Next, the isomagnetic lines within this latitude belt were drawn symmetrically about the auroral zone curve previously obtained from the magnetic data, and suitable proportionate adjustments were made along the geomagnetic meridians. It was found that the latitude distribution of the range in disturbance daily variation is likely to afford a fair indication of the dependence on geographical position of the larger transient magnetic changes lasting from some minutes to several hours, such as appear in bays, especially in high latitudes. A bibliography is appended. - V. S.

3. SEISMIC METHODS

7536. Agocs, W. B. A Method of Determining the Time Break on Deep Sea Seismic Records from the Water Sound Arrivals. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 163-174.

An abstract of this paper appeared in Geophysics, vol. 8, No. 3, 1943, p. 330 (see Geophys. Abs. 115, No. 7154).

7537. Byerly, Perry. Love Waves and the Nature of the Motion at the Origin of the Chilean Earthquake of November 11, 1922. Am. Jour. Sci., New Haven, vol. 19, No. 112, 1930, pp. 274-282.

On the assumption that the first motions of P and L types indicated by the seismograms of the Chilean earthquake preserve directional characteristics of the first motion at the focus (these directions are shown to be independent of epicentral distance between 39° and 162°) and that the first preliminary waves recorded at the stations had their source in the reflexion of primal shear waves at the earth's surface near the focus, the directions of first motions of the P and L types are interpreted to indicate as a sufficient source a shearing couple caused by a slip along a fault the strike of which lay anywhere from N. 27° E. easterly to E. 10° S. and which dipped to the left (as one looks NE. or SE. from the epicenter along the strike) at an angle of dip of from 69° to 90°. The faulting was normal and the horizontal movement was to the left (looking transverse to the fault from the trace). - Author's abs.

7538. Finch, R. H. Harmonic Tremor. Volcano Letter, University of Hawaii, Honolulu, No. 483, 1944, pp. 1-2.

One manifestation of volcanic activity is a continuous vibration of the ground. As long as volcanic activity goes on, nearby seismographs record small tremors. When this activity ceases, the tremors disappear from seismograms. Observations of such tremors were made in Hawaii and Japan

eginning about 1912. They were later distinguished into harmonic tremor ith a uniform period and amplitude, and spasmodic tremor with a greater ange of variation. The character of harmonic tremor is illustrated by osh-Omori seismograms from the Hawaiian Volcano Observatory. Four typical amples are presented to show this tremor under different conditions of the ava column at Halemaumau. The especially large tremors were recorded during ome of the most violent fountaining ever observed at Kilauea. During Mauna oa eruptions a mixed continuous tremor is recorded at the Hawaiian Observa- ory even though the source may be 22 miles away. In general, the tremor s larger when the magma column is falling than when rising. The harmonic remor affords good evidence of underground surging of lava, whether or not agma is visible in the pit. - V. S.

7539. Gutenberg, Beno, and Richter, C. F. Apparent Origin Time of $\bar{S}$. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 33, No. 4, 1943, pp. 269-279.

Representative travel times for 50 shocks in southern California indi- ate that transverse waves appear to leave the focus about half a second arlier, on the average, than longitudinal waves. If fault rupture is propa- ated with a speed greater than that of transverse waves, the originating f such waves along a moderately extended fault segment will completely ex- lain the observations. An exact theory is given on the simplest assumptions. Author's abs.

7540. Hayes, R. C. On Earthquake Distribution in New Zealand. Dominion Observatory, Bull. S-65, Wellington, 1944, pp. 236B-238B.

The distribution of destructive and nondestructive earthquake epicenters in New Zealand is presented on a map. The results, which include instru- mental data on earthquake intensities, confirm results previously arrived at regarding the distribution of destructive shocks, and also provide additional detail regarding the variation of seismic activity from place to place. - Author's abs.

7541. Horton, C. W. A Note on the Reading of Seismograms. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 160-162.

It is shown that a quick appraisal of the error in reading seismograms can be made by a statistical count of the occurrence of the third decimal. A method of interpretation is shown by analyses of five samples. - Author's abs.

7542. Kats, A. Z., and Puchkov, S. V. Ground Vibrations Produced by Impact Disturbances (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologic- heskogo Instituta, Moscow, No. 106, 1941, pp. 78-84.

A method is developed for determining the relationship between amplitudes of vibration of particles of the ground and the distances of these particles from the point of impact of a falling weight. Furthermore, the constant of elasticity of the ground is calculated. The problem of ground particles is approached in the light of the theory of central impact for two bodies of a different mass. The distribution of elastic displacements and stresses is studied in reference to distance from the point of impact; the discussion is mathematical. Certain experimental data on the vibrations of the ground under the impact of falling weights are further cited from the works of A. K. Biriul. They show that the distribution of amplitudes of ground vibrations follows the law of inverse proportionality to the distance from the source of disturbance. The conclusion is reached that Boussinesq's theory of the static effects of a concentrated force can be applied to the dynamic case of impact; provided the displacements of particles of the ground near the point of impact are taken into account. - V. S.

7543. Lawrence, R. W. Mechanism of Detonation in Explosives. Geophysics, Menasha, Wis., vol. 9, No. 1, 1944, pp. 1-18.

The detonation of high explosives was investigated in the light of the hydrodynamic theory of detonation. Two properties of explosives were studied, strength and detonation velocity. Moving film photography served for observations. The films illustrate the nature of detonation waves in explosives and of shock waves in the air, the propagation of detonation from one cartridge of blasting gelatin to another across air gaps and water gaps, etc. The high temperature of shock waves is confirmed by luminosity in the photographs; in liquids there was no luminosity. Experimentally determined values of the detonation velocity for nitroglycerin, blasting gelatin, and 60-percent gelatin dynamite were found to be in approximate agreement with the calculated values. - V. S.

7544. Leet, L. D. Vibrations from Blasting. Explosives Eng., Wilmington, Del., vol. 22, No. 2, 1944, pp. 57-61, 82.

During past years the author has studied vibrations propagated through the ground by blasting. He discusses the characteristics of these vibrations, the apparatus used in their study, and their effects on buildings. The vibrations are elastic waves of several types, traveling with different velocity. Only a small fraction of 1 percent of the initial energy of a blast is spent in these waves. Of that amount the so-called "surface waves" carry 90 to 95 percent. They are, therefore, the only waves that can affect buildings. The solidity of buildings must also be considered; such data are reasonably complete in engineering sciences. Equally complete information should be accumulated on the characteristics of vibrations by recording and studying them. This the author has endeavored to do. His data indicate that elastic vibrations can not, and do not, damage structures in the vicinity. Some instances of damage from earthquakes are discussed. Examples of records illustrate the text. - V. S.

545. Linden, N. A. Seismic Activity in 1939, According to the Observations of Teleseismic Stations of the Seismological Institute of the Academy of Sciences of the U.S.S.R. (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 1-5.

The teleseismic stations of the U.S.S.R. recorded 1,868 earthquakes n 1939. It has been possible to determine epicenters for 213 earthquakes. mong them, 13 earthquakes were very strong and produced destruction, and 2 earthquakes had a focus deeper than normal. The data on the major earthquakes are tabulated. The strongest earthquakes were as follows: Chile, January 25; Solomon Islands, January 30; Coral Sea, April 30; Pacific Ocean o the East of Japan, October 10; Celebes, December 21; and Turkey, December 27. Some of them are briefly described and characterized by examples of records. A map of epicenters of 213 earthquakes accompanies the text. The largest number of epicenters is located in the northern part of the Eastern hemisphere. - V. S.

7546. Masarskii, S. I. The Derivation of Equations for Hodographs of Waves Refracted and Reflected from the Surfaces of n Planar Inclined Boundaries (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 29-41.

Equations are deduced for the hodographs of seismic waves propagated under assumed generalized conditions. The assumptions postulate the depth of n strata with planar dividing boundaries, the angle of inclination of the boundaries, and propagation velocities of seismic waves in the strata; it is further assumed that the angle of inclination and the velocity are constant for each stratum. The trajectory of a wave is divided for purposes of mathematical discussion into 3 parts: (1) The descending ray; (2) the refracted ray; and (3) the ascending ray. The equations are evolved for waves refracted and reflected at the n-th surface. A comprehensive demonstration of mathematical derivation is presented. - V. S.

7547. Mintrop, Ludger. Über Anwendungen des seismischen Verfahrens im Erdölbergbau und ihre wirtschaftlichen und wissenschaftlichen Auswirkungen (On the Application of the Seismic Method to Oil Exploration and Its Practical and Scientific Aspects). Oel u. Kohle, Berlin, vol. 39, No. 10, 1943, pp. 269-287.

The seismic method is discussed with respect to its development and its practical and scientific applications.

(1) The method originated in the discovery of certain artificially generated waves by L. Mintrop in 1919. The underlying principles are described. The first practical application was made by Mintrop, L. Grube, and F. Gries in 1920. About that time the Seismos Co. of Hannover was founded. This organization has carried out extensive seismic exploration in Germany, Egypt, Iraq, Iran, Mexico, and the United States. By 1930 it had covered about 200,000 km.^{2}

(2) The practical applications of the seismic method are presented according to data from the United States. The discovery of the Blue Ridge, Boling Dome, Orchard Dome, East Hackberry, Sugarland, etc. oil fields is discussed; travel-time curves and maps of the fields illustrate the text. Statistics on the increase of dome discoveries during 1900-40 show an abrupt rise with the advent of geophysics.

(3) The scientific applications of the seismic method are exemplified by the work of Wiechert, Mohorovicic, Mintrop, Angenheister, Brockamp, O. Schmidt, etc. The Göttingen Geophysical Institute has made seismic measurements of the thickness of the Alpine glaciers and of the ice in Greenland. The first seismic observations on ice were made in 1922-23 in northern Sweden. Other investigations are mentioned. Travel-time curves and various data illustrate the text. - V. S.

7548. Ogievich, I. B. The Connections between Several Amplifiers Fed from a Common Source (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 60-63.

In seismic reflection surveying a use is made of multiple amplifiers fed from common power sources. In such use, complications are created by the formation of new interconnections within the amplifiers - for example, connections through the internal resistances of the power sources. The author discusses this latter instance. A generalized scheme of two amplifiers fed from a common source is presented. The plate currents will produce an alternating intensity in the internal resistance of the plate or B battery feeding all the tubes of both amplifiers. As a result, the second tube will be affected both by a "useful" input intensity amplified by the first stage, and by an "interfering" loss in intensity created by the plate current of the third stage of the effective amplifier. The ratio of the "useful" to the "interfering" intensity is termed the percentage of interference. A mathematical discussion deduces a formula for this percentage of interference. - V. S.

7549. Reich, H. Ergebnisse bei refraktionsseismischen Untersuchungen im Alpenvorland zwischen Inn und Melk (The Results of Seismic Refraction Surveys in the Alpine Foreland between Inn and Melk). Beiträge angew. Geophysik, Leipzig, vol. 9, 1942, p. 269.

The German State Office for Land Survey in 1939-41 made seismic refraction surveys along the northern ridges of the Alps, in the upper and lower Danube Basin. The purpose was to clarify the stratigraphic conditions in the Tertiary, which is well-developed in this region. Usable reflections were not obtainable, and stratigraphic boundaries were determined by means of refractions. The horizons outlined were found to be mostly the results of tectonic forces not necessarily corresponding to stratigraphic horizons; they are termed "phantom horizons." Several factors influencing seismic velocities in these surveys are discussed: (1) The elevations of the shot and registration points; (2) diluvial and alluvial coverings; (3) the nature of the Tertiary rocks; and (4) the various conditions of the strata. - V. S.

550. Richter, C. F. Mathematical Questions in Seismology. Bull. Am. Mathematical Soc., New York, vol. 49, No. 7, 1943, pp. 477-493.

Mathematical questions in seismology are reducible to three principal ets of differential equations: (1) Equations of motion of the recording nstruments; (2) equations of motion of elastic solid bodies; and (3) quations of propagation of elastic waves in the interior of the earth usually assumed as spherical). The first set is the simplest, and its heory is well-worked-out. The statistical approach is here important in he treatment of errors; in this connection, H. Jeffrey's method is men- ioned. The second set comprises a vector equation and two equations for he components of the stress tensor in terms of the derivatives of the dis- lacement. These classical equations are called for whenever it is neces- ary to apply boundary conditions. They are cited, and their mathematical onsequences, generalizations, and modifications are analyzed. Rayleigh nd Love waves and derived plane waves are discussed. The third set com- rises equations identical with those of geometrical optics. The chief ifference lies in the determinations of time. Fermat's "principle of east time," the "eikonal" equation associated with the variation principle, nell's law of refraction in its polar form, and other equations of "optical" eismology are discussed. A comprehensive bibliography is appended. - V. S.

551. Riznichenko, G. V. Seismic Properties of Ground Layers Permanently Frozen (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Sér. Géog. et Geophys., Moscow, No. 6, 1942, pp. 263-274.

Conceptions relating to the seismic properties of permanently frozen ayers, as adopted by various investigators, are critically examined. The ork carried out by the author in 1940 has proved that such layers do not nterfere with seismic prospecting. On the contrary, a frozen condition ometimes is favorable for interpretation of the results. - W. A.

552. Ruby, G. M. Petroleum Exploration in Chile. Petrol. Interamericano (printed in Spanish and English), Tulsa, Okla., vol. 2, No. 1, 1944, pp. 81-87.

Corporación de Fomento de la Producción, an agency of the Chilean overnment, undertook recently to determine whether there is petroleum in hile. Foreign geophysicists and geologists have directed exploration. econnaissance revealed definite promise of commercial deposits only in he extreme south of Chile. The geology of this region is described and iscussed. Seismic surveys were made in the drift-covered plains. In the oothills, where outcrops are available, geological mapping was carried out. he results have shown that a drilling campaign is justified. - V. S.

553. Rudashevskii, G. E. Considerations Regarding the Practical Utilization of Induction Voltmeters (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 91-95.

The principle of the induction voltmeter can be utilized in the construction of electroseismographs and vibrographs for obtaining a larger recording of displacements. Various examples are described of the application of voltmeters in other fields, and samples of oscillograms are shown. - V. S.

7554. Seismological Society of America, Eastern Section. Earthquake Notes (A. K. Ludy, ed.). Washington, D. C., vol. 15, Nos. 3-4, 1944, 7 pp.

Among the notes contained in this issue the following are of broad interest: (1) A possible great earthquake in the State of Washington; (2) a vibration meter with variable period and magnification; and (3) seismic sea waves. - V. S.

7555. Sharpe, J. A. The Effect of Charge Size on Reflection Records. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 131-142.

Examples are presented showing the effect of charge size on: The ratio of the amplitude of reflected motion to that of surface waves; the ratio of the amplitude of reflected motion to that of random interference; the frequency spectrum of reflected motion. The similarity between these observations and the effects of changing depth of shooting are discussed. It is concluded that the use of a larger or a smaller charge in a particular circumstance may be the means of effecting a useful improvement in a record. - Author's abs.

7556. Shnirman, G. L. A Condenser Seismograph for Prospecting by the Method of Refracted Waves (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 49-53.

Seismic refraction surveying imposes special requirements on seismographs due to the long periods of ground oscillation. The electromagnetic and electrodynamic seismographs do not satisfy these requirements because of short period or insufficient sensitivity. Particularly well-suited for long periods is the condenser electroseismograph. Its main deficiency is instability caused by dependence on temperature and batteries. These factors are controlled in the new seismograph constructed by the author at the laboratory of the Seismological Institute of U.S.S.R. The instrument is described. Its principal part is a differential condenser consisting of three rectangular plates. Two external plates are fastened rigidly to the body of the apparatus; the intermediate plate is attached to a vertical pendulum and moves between the other plates with pendular oscillations. The vertical pendulum is suspended on a cylindrical spiral spring with zero initial length. The scheme of electrical wiring is illustrated by a diagram. The apparatus is operated on D. C. current. - V. S.

557. Short, E. H., Jr. Distant Offshore Seismic Survey Conducted in Gulf of Mexico. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 16, 1944, pp. 87-89.

The Superior Oil Co. has undertaken seismic exploration of the submarine rritory of the Gulf of Mexico south of Cameron, La. The work extends 26 miles ffshore and to depths down to 45 ft. The equipment, problems, and plan of perations are described. The surveying is carried on from five boats with high aneuverability. The laying out of profiles offers difficulties, particularly n rough waters. Specially designed buoys and floating backsights are used. he geophones are encased in cement jugs with a broad flat bottom. During operations a backsight boat and a chaining boat precced the two shooting boats and he recording boat. Each time the recording boat is anchored, one of the shooting boats plants the geophones. Then the shooting boats occupy their positions 2,000 ft. in front and behind the recording boat. Upon receiving a telephone order from the recording boat, each shooting boat fires its charge. The escription of the work is illustrated by drawings. - V. S.

558. Wolf, Alfred. The Equation of Motion of a Geophone on the Surface of an Elastic Earth. Geophysics, Menasha, Wis., vol. 9, No. 1, 1944, pp. 29-35.

The motion of a geophone case placed on the surface of an elastic earth oes not follow faithfully the motion of the earth at high frequencies. In effect, weight placed on the surface of an elastic solid constitutes a damped oscilating system. The elastic restoring forces are determined by the area of conact between the weight and the surface of the solid and by the elastic moduli f the solid. The damping force is due to emission of elastic waves by the scillating weight. The motion of the solid also contributes to the inertia of he system. Equations are developed for these forces on the assumption that the ave length is long compared to the linear dimensions of the area of contact beween the weight and the elastic solid. This leads to a determination of the requency of oscillation and of the decrement of such a system. - Author's abs.

4. ELECTRICAL METHODS

559. Bauernschmidt, A. J., Jr. West Ranch Oil Field, Jackson County, Tex. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 28, No. 2, 1944, pp. 197-216.

The West Ranch field is situated in the southwest corner of Jackson County, ex. Like most Gulf Coast fields, it has a structure formed by the movement of eep salt mass. The discovery well was completed in 1938. Since then electrical logs were run in most wells. The field has now nine producing sand zones, ost of them of Frio age. The zones are discussed, and samples of electrical ogs are shown for a type section and for all nine zones. For a major field, est Ranch is exceptionally free from faulting. - V. S.

560. Guyod, Hubert. Electrical Well Logging. Part 1: Review of Well-Logging Methods. Oil Weekly, Houston, Tex., vol. 114, No. 10, 1944, pp. 38-50.

This article is the first of a series designed to give complete information n electrical well logging. An introductory review is presented. It covers

briefly all existing and suggested logging methods and their subdivisions: (1) Acoustic method; (2) Chemical methods: Insoluble residues, hydrocarbon content of samples, gas detection in mud; (3) Electrical methods: Natural potential, secondary potentials, electrical conductivity of formations, electrical conductivity of drilling mud, high-frequency response, polarization, electrical transient; (4) Gravitational method; (5) Intake method; (6) Magnetic methods: Susceptibility measurements, retentivity measurements; (7) Mechanical methods: Hole calipering, drilling rate, drilling reaction; (8) Optical methods: Optical examination of formations, visual examination of samples, fluorescence of formations, fluorescence of drilling fluid; (9) Radioactive methods: Natural radioactivity, artificial radioactivity; (10) Seismic method; and (11) Thermal methods: Gradient method, evolution method. The physical properties of the rocks, minerals, and fluids logged and the applicability of each method to the important problems of logging are summarized in two tables. General discussion is devoted to basic problems of logging, selection of logging methods, techniques in open holes, special problems, and the future of electrical logging. A bibliography is appended. - V. S.

7561. Guyod, Hubert. Electrical Well Logging. Part 2: Three Dimensional Flow of Electricity. Oil Weekly, Houston, Tex., vol. 114, No. 11, 1944, pp. 34-40.

A clear understanding of electrical logging requires some familiarity with elementary electrodynamics. In this paper the basic principles of the flow of electricity in the ground are explained by analogies with the flow of fluids in porous media. The discussion covers the flow of water in a pipe, the flow of electricity in a wire, Ohm's law, d'Arcy's law, structure of metals, arrays of nuclei, three-dimensional flow of liquids, and three-dimensional flow of electricity. - V. S.

7562. Guyod, Hubert. Electrical Well Logging. Part 3: The Single-Point Resistance Method. Oil Weekly, Houston, Tex., vol. 114, No. 12, 1944, pp. 44-52

Equations are discussed for calculating the resistance of variously shaped electrodes, from a uniform wire to a homogeneous shell. These equations are further applied to computation of the resistance which the ground offers to a current flowing from a spherical electrode to a remote region. A formula is evolved for the resistance of the spherical electrode, showing its dependence on the electrode's radius and the material in which it is located. Only the material close to the electrode can materially affect its resistance. From this formula is derived the single-point resistance method. A spherical electrode is placed in the formation under investigation. The intensity of a current flowing from the electrode into the formation and the voltage drop between the electrode and a remote point are measured. The ratio between these two values is computed. Then the resistance of the electrode is determined by multiplying this ratio by the value $4\pi r$, where r is the radius of the electrode. The advantages and limitations of this method are discussed. Examples of single-point resistance logs illustrate the text. - V. S.

563. Hubbert, M. K. An Exploratory Study of Faults in the Cave in Rock and Rosiclare Districts by the Earth-Resistivity Method. Geol. Survey, Washington, D. C., Bull. 942, pt. 2, 1944, pp. 73-147.

This report is a presentation of the results of an electrical-resistivity urvey conducted in the fluorspar-bearing areas of Hardin County, Ill., rincipally during the field seasons of 1934 and 1935. Gish-Rooney apparatus mploying the Wenner four-electrode method of measurement was used. Tra- erses were run in directions usually transverse to the strike of the domi- ant systems of faults. In all but two short profiles, the electrode spacing as 100 feet with the measurements made at 100-foot intervals. The line of lectrodes was parallel to the line of traverse. Most of the work was done n two districts, one near the town of Rosiclare and the other in the mining istrict northwest of Cave in Rock. In many cases the presence of faults as clearly indicated. A fault was mapped for a distance of about 2 miles n the alluvium-filled valley of Wallace Branch about 3.5 miles west of Rosiclare. Some of the branches of the Peters Creek fault in the Cave in Rock district were clearly shown. In many other instances anomalies appeared he causes of which were not evident, but they may be related to structural isturbances.

One curious anomaly was discovered at station 83.5 on profile 13 in he Rosiclare district. It suggests an unusual subsurface condition, which arrants further consideration. In the Cave in Rock district a region of arked disturbance was indicated in the northeast part of the resistivity rid, suggesting the possibility of complex fracturing of small displace- ent favorable to the infiltration of mineralizing solutions. This locality is indicated as being one of the most hopeful prospects of the territory surveyed.

Although the significance of many of the observed anomalies is not clear, it is possible that their existence may provide useful clues for the guidance of direct prospecting. With this in view, not only have the author's own interpretations been presented, but the direct measurements themselves have been plotted in graphical form. - Author's abs.

7564. McCann, G. D., and Morgan, D. E. Field Disturbances Produced by Lightning. Trans. Am. Inst. Elec. Eng., Suppl., New York, vol. 62, 1943, pp. 345-357.

A survey is given of the variation of the earth's electric field during disturbed weather conditions, and in particular due to lightning discharges. With certain assumptions of charge distribution along the channel of the leader stroke and the velocity of propagation of the return stroke, the magnitudes and wave shapes of the individual components of the resulting field changes are determined as a function of the stroke distance, and the effects of varying parameters are investigated. The variation of field changes obtained theoretically is compared with published field observations. The field changes produced by cloud-cloud strokes are discussed. - R. H. G., Sci. Abs., Sect. A, vol. 47, No. 555, 1944.

7565. Tolkachev, M. The Findings of Electrical Surveys in the District of Soligalich, Province of Iaroslavl' (in Russian). Razvedka Nedr, Moscow, vol. 11, No. 3, 1941, p. 29.

An electrical resistivity survey has been made in the Soligalich district, in eastern central Russia. It was carried out in keeping with the proposed geophysical exploration of central Russia for oil, planned in 1939. Soligalich was selected because an anticline had been discovered here previously. The survey revealed a NE.-SW. zone of high electrical resistivity. The three focal anomalies in this zone lie on a straight line and exceed 300 ohm-cms. Among them the anomaly westward from Soligalich is the most pronounced. Electrical resistivity sharply declines NW. of the zone, indicating a dip of the main strata. The findings are embodied in a structural map. The Soligalich structure should be interpreted as a brachy-anticline, a type of fold frequent in the eastern part of the central Russian plateau. Tentative conclusions are made concerning the stratigraphic position of the horizon of high electrical resistivity in the explored region. - V. S.

7566. Way, H. J. R. Reef Prospecting by the Resistivity Method in Uganda. Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1676, 1944, 17 pp.

In 1937-39 the Busia gold field in the reef country of eastern Uganda was explored by the resistivity method. Disintegrated reefs in the thin laterite near the surface made the prospecting uncertain. A Gish-Rooney arrangement of potentiometer and equipment was used; the instruments are described. Notwithstanding unfavorable conditions, very satisfactory resistivity curves were obtained; they are analyzed and illustrated by examples. The diversity in their shapes and characteristics suggests a relationship between the electrode separation width of reef, and a constant of the corresponding curve. Departures from standard curves are explained by the peculiar geology of the reefs and the associated float masses. The survey located three new veins; only one contained enough gold to warrant further exploration. - V. S.

5. RADIOACTIVE METHODS

7567. Bliss, A. D. Radioactive Substances. III. The Analysis and Age of a North Carolina Monazite. Am. Jour. Sci., New Haven, Conn., vol. 242, No. 6, 1944, pp. 327-330.

A monazite from Spruce Pine, N. C., has been analyzed for thorium (4.83 percent), uranium (0.02) percent), and lead (0.13 percent). The age as calculated by the customary formula is approximately 600 million years. - Author's abs.

7568. Campbell, J. L. P. Gamma-Ray Logging in East Texas. Petrol. Eng., Dallas, Tex., vol. 15, No. 4, 1944, pp. 156-158.

Work-over estimates in East Texas usually include gamma-ray surveys. e principles of such logging are indicated, and three examples of its plication and interpretation are given: (1) Log of a well in Upshur unty through one string of casing; (2) well logged through chalk section ving liner on bottom overlapping oil string; and (3) well near Gladewater gged in both open hole and cased hole. An intercorrelation of gamma-ray gs and their comparison with electrical logs can furnish additional useful formation. - V. S.

569. Curtiss, L. F., and Davis, F. J. A Counting Method for the Determination of Small Amounts of Radium and of Radon. Jour. Research, Nat. Bureau of Standards, Washington, D. C., vol. 31, No. 3, 1943, pp. 181-195.

A method for determining small quantities of radon is described, in hich the alpha particles from radon, RaA and RaC are counted in an ion- ounting chamber. Details of an arrangement for automatically making a rinted record of the hourly totaled count are given. Advantages of this ethod over that using an ionization chamber with electrometer are discussed. Author's abs.

570. Howell, L. G. Gamma-Ray Measurements in Oil Wells. Electronics, Albany, N. Y., vol 17, No. 3, 1944, pp. 130-133, 286.

Electronic equipment is used in geophysics for gamma-ray logging, eiger-Müller counter measurements, and radioactive cement tracing. (1) amma-ray logging can be made irrespective of casing and metallic pipes. adioactive elements include the uranium series, throium series, and po- assium. The essentials of the technique are outlined. (2) The Geiger- üller counter method uses counter tubes as detectors. Pulses from indi- idual secondary particles produced by gamma rays are "counted" in the G-M ube. The method is discussed, and comparisons are made between electric nd electronic logs. (3) Radioactive cement measurements are an application f gamma-ray logging. A tracing is made in oil wells of cement made radio- ctive by the addition of carnotite ore. The gamma-ray curve is compared ith a temperature log of setting cement. Several examples of electrical ogs, electronic logs, and a temperature log illustrate the text. - V. S.

571. Kalapesi, A. S., Chhapgar, S. K., and Sukheswala., R. N. The Age of the Rajmahal Traps and Some Neighbouring Dike Rocks by the "Lead-Ratio" Method. Quart. Jour. Geol., Min. and Met. Soc. India, Calcutta, vol. 15, No. 3, 1943, pp. 127-132.

Specimens of basalt, dolerite dikes, and mica peridotites, gathered in ndia from the Rajmahal Hills and the coal-fields of Raniganj, Jharia, and Giridih, have been studied by means of the "lead-ratio" method to determine their geological age. The occurrence, distribution, and stratigraphy of these rocks are described. The results were obtained by analyses for uranium,

thorium, and lead. (1) The age of the Rajmahal Hills is found to be 22.8 million years; this age cannot be considered conclusive because only one specimen was available. (2) The five dikes in the coal fields have an age between 30.4 and 83.6 million years. The latter figures show that the dikes in the coal fields are distinct from the Rajmahal flows and form subsequent intrusions probably connected with the Deccan traps. Thus, the "lead-ratio" assigns a Tertiary age to the dikes and refutes the Jurassic age attributed to them on the basis of their geographic proximity to the Rajmahal Hills. - V. S.

7572. Keevil, N. B. Thorium-Uranium Ratios in Rocks and Minerals. Am. Jour. Sci., New Haven, Conn., vol. 242, No. 6, 1944, pp. 309-321.

100 recent determinations of thorium-uranium ratios, including some new data, are assembled and plotted in frequency-distribution curves. A probable value of 3.2 is indicated for basic, acidic, and intermediate rocks, but regional grouping of the results suggests that the ratio may be as high as 3.5. Independent confirmation that the Th/U ration lies within this range is obtained from Nier's determinations of abundances of lead isotopes from samples of ore-lead. For most purposes a constant value of 3.2 may be assumed for the Th/U ratio. This leads to no significant error in alpha-counting theory, in determinations of the rate of production of radiogenic heat, or in determinations of the rate of accumulation of helium and lead in rocks. The results do not support Holmes' theory of the genesis of lead ores from a deep-seated source. - Author's abs.

7573. Komlev, L. V. The Age of the Pegmatite Dikes of North Karelia (Abs.). Internat. Geol. Cong., 17th sess., U.S.S.R., 1937; Abs. of papers, Moscow, 1937, p. 195.

Geological data place the North Karelian pegmatite dikes among the youngest formations of the White Sea series, but the data of radioactive disintegration class them among the most ancient known so far. The author describes the conclusive features of the radioactive method, such as the sharply manifested differentiation of elements, the multiphase character of uraninite formations, the constancy of ratios of lead to uranium, and the almost equal value of lead ratios for uraninite and monazite. He concludes that the radioactive measurement seems to be the more accurate determination of the two. Accordingly, the pegmatite dikes of North Karelia must occupy a very early chronological position in the pre-Cambrian series. - V. S.

7574. Lane-Wells Co. Lane-Wells Radioactivity Well Logging. Lane-Wells Co., 5610 South Soto St., Los Angeles 11, Calif., 52 pp.

The Lane-Wells Co. has issued a bulletin discussing the nature of radioactivity and the applications of radioactivity logging to problems of the petroleum industry. Typical curves and sections are reproduced from nearly all the principal oil areas in the United States. Methods and techniques

re outlined for application to work-over and remedial programs. The publi-
ation is considered the most complete text to date covering actual field
xperience in radioactivity logging. - V. S.

575. Russell, W. L. The Total Gamma-Ray Activity of Sedimentary Rocks as Indicated by Geiger-Counter Determinations. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 180-216.

Geiger-counter determinations of the gamma-ray intensity of 510 rock
amples have been made to determine the average radioactivity and frequency
istribution of radioactivities of the various types of sedimentary rocks.
he results, expressed in units of gamma-ray intensity, show that limestones,
andstones, and dolomites are of relatively low radioactivity, shales much
igher, and black bituminous shales highest of all. The new data on the
amma radiation of the sediments may be used to improve the interpretation
f radioactivity logs and to determine the value of surface radioactivity
urveys. - Author's abs.

7576. Seaborg, G. T. Table of Isotopes. Rev. Modern Phys., Lancaster, Pa., vol. 16, No. 1, 1944, pp. 1-32.

This table presents a complete list of all the artificial and natural
radioactive isotopes and stable isotopes known before June 1, 1944. It
gives also important features associated with them, atomic numbers and mass
numbers, the degree of certainty of each assignment of a radioactive isotope,
the percentage abundance of the stable isotopes, the type of radiation (nega-
tive beta-particles, positive beta-particles, gamma-rays, alpha-particles,
etc.), half-life, energy of radiation in Mev., and the observed nuclear
reactions. The table is accompanied by a list of references, providing in
most cases a key to the complete literature. - V. S.

7577. Sheppard, C. W. Radioactivity and Petroleum Genesis. Bull Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 28, No. 7, 1944, pp. 924-952.

The conversion of organic substances to petroleum in the sedimentary
environment is discussed. The present available information is reviewed
concerning probable source materials and the conditions of deposition. The
significance of the porphyrin content of petroleum is reviewed. An outline
of the thermodynamical and kinetic aspects of petroleum conversion is given.
As a possible activating agent the radiations from radioactive materials in
sediments are selected for discussion. A survey is made of the pertinent
literature on known chemical reactions produced by alpha-particle bombard-
ment. Possible mechanisms are mentioned whereby alpha particles may cause
molecules to react chemically. Approximate calculations are made of the
efficiency of conversion of organic material to petroleum by alpha-particle
bombardment under certain hypothetical sedimentary conditions. These calcu-
lations show that the rate of conversion is highly dependent upon the relative
association in the sediment between the organic material and the radioactive

constituents. In a uniform, homogeneous sediment containing 2.5 percent organic matter and having a concentration of 2.7×10^{-6} gram of uranium and 8×10^{-6} of thorium per gram, approximately 2/5 of the total organic content may be converted in 100 million years. Due to the uncertainty in the available data no definite conclusion may be made as yet as to the importance of sedimentary radioactivity in petroleum genesis. - Author's abs.

7578. Zwerger, R. von. Über weitere Erfahrungen mit radioaktiven Messungen in Bohrlöchern (Concerning Further Experiences with Radioactivity Measurements in Boreholes). Oel u. Kohle, Berlin, vol. 39, No. 43/44, 1943, pp. 935-941.

The progress of radioactive logging in boreholes during 1939-42 is described, including instruments, intensity of the gamma-radiation of rocks, trials of neutron-logging, and problems of interpretation. Both geological and production aspects are considered. American literature supplies a substantial part of the source material. The text is illustrated with examples of logs. - V. S.

6. GEOTHERMAL METHODS

7579. Kraskovsky, S. A. Geothermal Measurements in Oil and Salt Fields (in Russian). Akademiia Nauk S.S.S.R., Trudy Komissii po Geotermike, Moscow, Vypusk I, 1941, pp. 30-44.

The geothermal measurements in Russian oil fields were comparatively numerous. The author reports 78 surveys during 1906-38 in the major fields of the Caucasus, Groznyi, Don Basin, Ural Mountains, Kazakhstan, etc. He describes and analyzes problems, methods, and instruments and presents data on the depths of measurements, the temperatures, and the geothermal gradients. Geological profiles and curves of temperature-change with depth illustrate the text. In the reviewed surveys the depth of measurements ranged from 56.7 to 1,200 meters. The results show a variation of geothermal gradients from 7.5 to 108.1 m/C°; in one doubtful case the gradient was 130.4 m/C°. Some conclusions are given. The comprehensive survey of the Groznyi district made by Iachevskii in 1913 has led him to conclude that the thermal picture of this oil region is different from that of regions containing no oil. A survey of the Novogroznenskii district indicated that high temperatures were associated with boreholes containing little oil but much water. A survey of the Verkhnechusovskii oil field by the author in 1934 showed that boreholes on the boundaries of a subsurface structure have higher temperatures than boreholes near its apex; he considers prolonged production the cause. Other observations are mentioned. - V. S.

7580. Taylor, N. W., and Noyes, Bradford, Jr. Aging Thermometers. Pennsylvania State College, Mineral Ind. Exp. Sta., Tech. Paper 92, 1944, 6 p.

During the long-time aging of thermometers at constant temperature, he change in readings of a fixed point, such as the ice point, normally ollows an exponential law, $y = a(1-e^{-mt})$. Methods are described for the valuation of the total expected change, a, of the relaxation time, 1/m, nd of the half-life period, H = 0.693/m. Examples are given and calcu- ations are made of the expected change remaining after any aging time, t. t is believed that the exponential law is due primarily to bulb shrinkage nder the influence of a single molecular mechanism in the glass. Some xamples are presented of anomalous behavior, such as reversals in the irection of change. This phenomenon is shown to be a general one in glass, nd an interpretation is given in terms of several molecular processes hich operate at one time but with different characteristic rates. An ex- ression is derived for the calculation of change of density in glass, ased on experiments in which the glass is in the form of a thermometer. he methods of mathematical analysis described in this paper are useful or evaluating the effects of accelerated aging treatments on glass. - uthor's abs.

7. GEOCHEMICAL METHODS

7581. Chin, Y. H., and Juan, V. C. On the Possible Oil Fields in Szechuan as Indicated by Isocarb Lines. Bull. Geol. Soc. China, Pehpei, Chungking, Szechuan, China, vol. 20, Nos. 3-4, 1940, pp. 357-367.

The Red Basin of Szechuan in China shows many indications of oil, but t is not known in what areas oil can be found in commercial quantities. he present paper describes a preliminary survey by means of carbon ratios. he carbon-ratio theory is outlined. It maintains that the character and omposition of coals in formations are influenced by the presence of oil nd can serve as a guide for detecting the oil. The stratigraphy of the ed Basin is discussed. It leads to the conclusion that the widely distri- uted Hsiangchi coal series is the only coal formation suitable for the arbon-ratio method. Numerous analyses of these Jurassic coals had been ade previously and were available for the survey. They provided the data or plotting isocarb lines. These data and the method of plotting are de- cribed. It is concluded from the isocarb maps, as well as from source eds, reservoir rocks, favorable structures, etc., that the Lungchang-Jung- hang area offers the greatest promise of oil. The Weiyuan-Chienwei area nd the Yungchuan-Chiangtsin area are possible, but the Tzeluching-Kungching nd the Pahsien-Changshou areas are quite unfavorable. - V. S.

7582. Seismograph Service Corporation. Well-Logging Laboratory. World Petrol., New York, vol. 15, No. 5, 1944, p. 75.

The Seismograph Service Corporation, Tulsa, Okla., has designed a portable laboratory for mud analysis during well drilling, with a view to detecting oil-bearing horizons. This laboratory is mounted on a 1-1/2-ton truck or trailer and is operated by three engineers. For mud tests, the drilling fluid is continuously sampled and pumped to the laboratory. The

gas liberated from the mud mixes with the air stream and is indicated by a gas detector. Samples for oil detection are taken periodically and examined under ultraviolet light. Together with the mud analysis, a log is plotted of the following data: (1) The presence of oil and gas in the formation; (2) the exact depth of the test; (3) the drilling rate; and (4) the depth of the gas-oil contact. The description of the laboratory is illustrated by a drawing. - V. S.

7583. Tageeva, N. V. Fluorine and Boron in Natural Waters and Their Bearing on the Occurrence of Petroleum. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 34, Nos. 4-5, 1942, pp. 117-120.

The author seeks to verify by means of geochemical analysis the hypothesis of L. V. Khmelevskaia that intrusive masses can affect oil formation. She presents experimental data on the fluorine, boron, and phosphorus content of different natural waters, including oil-field waters. From this material it is apparent that the alkaline oil-field waters are connected with magmatism. Thus, magmatism must play a part in the formation of Cenozoic oil deposits. - V. S.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

7584. Barsch, O., and Zwerger, R. von. Erdölgeophysikalische Untersuchungen im europäischen Teil der Sowjetunion (Geophysical Exploration for Oil in the European Part of the Soviet Union). Oel u. Kohle, Berlin, vol. 38, 1942, p. 1411.

An outline is given of Russian oil exploration after the first World War, region by region.

(1) In the Crimea-Caucasus lowlands gravimetric measurements served for delineating tectonic boundaries and synclines. In the Baku and Grozny districts seismic and electric methods were used for detecting subsurface anticlines. The Grozny district was first surveyed gravimetrically.

(2) In the northern part of the Crimea-Caucasus region the Pliocene is very well-developed; it has been explored particularly attentively in its entirety. The Maikop-Kuban area was surveyed by seismic reflection measurements for delineating sand sections and determining monoclinal structures near the Caucasus Mountains. On the Kerch Peninsula electrical resistivity measurements were made.

(3) Between the Donets region and the lower Volga, pendulum measurements have led to the detection of the southeastern ramifications of the Donets Mountains which were covered by a strong Tertiary-Cretaceous formation 400 to 500 m. thick.

(4) In the Ukrainian and pre-Caspian regions, surveys were made by various geophysical methods; the work is illustrated by sketch maps, profiles.

nd examples. The Caspian depression was the subject of especially comrehensive regional gravimetric explorations. This area is underlain by ome 1,500 to 1,600 salt domes indicated by gravity-minima producing disurbance amplitudes of 15 to 35 mgl.

(5) In the "Second Baku" region between the Volga and the Urals a arge number of promising structures has been discovered by geophysical ethods. - V. S.

7585. Bazzoni, C. B. A Synopsis of Three Lectures on Modern Applied Geophysics. Bull. Wagner Free Inst. Sci., Philadelphia, vol. 19, No. 2, 1944, pp. 17-23.

A brief account is given of the gravitational, magnetic, seismic, electrical, radioactive, and logging methods with respect to field work, instruments, interpretation of data, relative advantages, etc. The different variations of methods and various special techniques are indicated. - V. S.

7586. Colbert, L. O. Geophysical Measurements in the American Republics. Sci. Monthly, Washington, D. C., vol. 58, No. 6, 1944, pp. 435-443.

The United States and Geodetic Survey has carried on geophysical work in Latin-American republics in pursuance of the good-neighbor policy. The work included gravity determinations in Colombia and Peru; the establishment and maintenance of 14 automatic tide gages in 8 republics; magnetic observations in all 20 republics; cooperation in seismological work; arrangements for the exchange of personnel to assure standardized methods of observation; and translation into Spanish of several manuals on these geophysical operations. These activities are described. Particular attention was devoted to geomagnetism marked by unusual features in South America. The magnetic equator, which crosses South America about 10° south of the true equator, has been slowly moving southward. It is important to know whether this trend is continuing, especially as it may be related to movement of the magnetic poles. Other magnetic conditions in South America are likewise of interest. As a part of the work, the new volcano Paricutin in Mexico was surveyed magnetically 3 months after the first eruption, while it was still building up its cone and extending its lava field. - V. S.

7587. Cotton, L. A. The Constitution of the Earth's Interior. Australian Jour. Sci., Sidney, vol. 6, No. 4, 1944, pp. 101-104.

The constitution of the earth's interior cannot be studied directly but must be reconstructed from the evidence supplied by many different sciences. The author reviews briefly the contributions of geology, geodesy, astronomy, celestial mechanics, study of meteorites, and particularly, seismology, which furnish knowledge of the outer crust, shape of the earth, density, elasticity, distribution of discontinuities, etc. The theoretical earth thus pieced together has been tested and is found to conform to all

known scientific requirements. It gives the best picture available with the present evidence. - V. S.

7588. Davidson, Stanley. Modernized Exploration Technique in Eastern Canadian Mining Fields. Canadian Min. and Met. Bull., Montreal, No. 381, January 1944, pp. 49-52.

The present exploration technique in eastern Canada should be modernized by supplementary geological mapping, geophysical surveying, and pilot diamond drilling. The benefits of such modernization are illustrated by the following examples. (1) Sudbury district: International Nickel and Falconbridge have made geological plane-table maps of the rim of the Sudbury nickel basin, the Frood, Copper Cliff, Foy, Worthington, and Frood-Stobie offsets, and the Creighton surface. Then geomagnetic surveys were carried out. As a result, a number of ore bodies were discovered. (2) Noranda district: Plane-table geological surveys were made at Polletier Lake and on the property of Lake Durault Mines, near the Amulet "A" ore body. They revealed an upper rhyolitic horizon. - V. S.

7589. Ebbley, Norman, Jr. Oil Seepages on the Alaskan Arctic Slope. Min. and Met., New York, vol. 25, No. 453, 1944, pp. 415-419.

Oil certainly exists along the Arctic coast. The question is, how much, and can we get it out economically. To find just where the oil exists and how much will require extensive core drilling and geological studies. Geophysical techniques are not so well-adapted. The climate and living conditions are terrible, as the author makes clear. But oil men are not the sort to let physical discomforts deter them - only it's usually heat and humidity rather than cold that they have to fight. - Author's abs.

7590. Gallie, J. F. History of the Society of Exploration Geophysicists. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 238-242.

A brief history of the Society of Exploration Geophysicists is presented. It describes its formation in 1930 on the initiative of D. C. Barton, the adoption of a constitution and bylaws, election of officers, presentation of papers, growth of the membership (totaling 1,001 members in 1943), amendment of the constitution in 1935, foundation of a journal, financial status, etc. This account is accompanied by a text of the constitution and bylaws and the membership list as of March 1944. - V. S.

7591. Howard, W. V. Prospecting for Stratigraphic Traps. Petrol. Interamericano, (printed in Spanish and English), Tulsa, Okla., vol. 1, No. 3, 1944, pp. 59-61.

In stratigraphic and erosional traps a structural closure exists on fewer than four sides. The remaining sides are characterized by a disappearance of porosity. The author analyzes four types of such traps, with a view to prospecting possibilities.

(1) Traps with structure on three sides are the simplest; search for such oil accumulations follows seven essential steps which are described.

(2) Traps with structure on two sides are very uncommon; they are not discussed.

(3) Traps with structure on one side are typical of the occurrence of oil in a bay on an old shore line; drilling at a long or short distance above the normal line of pinchout, which is very costly, constitutes almost the only way of finding them.

(4) Traps with no structural closures on their sides are typified by shoestring sand deposits; these deposits have usually a convex upper surface forming a sort of pseudo-structure discoverable by surface mapping.

The author concludes that successful search for stratigraphic traps is at present confined to those which are located on structure or are intersected by structural trends. Exploration made down the flanks of structures or along shore-line trends has a probability of success between 1 in 5 and 1 in 20. - V. S.

7592. Howe, H. V. Use of Paleontology by the Oil Industry. Jour. Sedimentary Petrology, Tulsa, Okla., vol. 13, No. 3, 1943, pp. 105-107.

This paper discusses briefly various uses which have been made of paleontology by the oil industry in the past. Present uses of paleontology in correlation and sedimentation studies are discussed. Suggestions are made as to how paleontology can be of added value as an aid in the finding of petroleum. - Author's abs.

7593. Illing, V. C. Education and the Petroleum Industry. Jour. Inst. Petrol., London, vol. 29, No. 238, 1943, pp. 259-283.

A part of this paper is devoted to exploration. The view is expressed that in the search for oil cooperation between geophysics and geology is a prime condition of success. The author stresses cooperation because geophysics and geology have been often regarded as rivals. The differences go back to methods of training. The physicist is trained to measure with great accuracy, while the geologist is interested in historical perspective. Actually, neither can work without the other. The physicist possesses the only tools for direct measurement into the earth; but the results he obtains must be presented in geological terms. The true function of geology is to eliminate unnecessary risks, to balance main chances, and to interpret findings. The author further stressed that geology is not the only branch of science that must cooperate with geophysics. As the discoverable oil fields become fewer and more deeply buried, the task of finding them requires the assistance of ever-broader fields of knowledge. As a result, the geophysicist must satisfy two almost contradictory demands - a broad basis of scientific knowledge and a high degree of specialization in one direction. These

demands can be reconciled if the first is made the prime object of education and the second is built up largely by experience. - V. S.

7594. Isham, C. A. The Role of the Geophysical Engineer. Min. Jour., Phoenix, Ariz., vol. 27, No. 10, 1943, p. 7.

Some geophysicists are now turning their attention to mining and the search for ores. They assist mining engineers and geologists by mapping mineral-bearing regions and indicating potential ore bodies. Such maps are then verified by core drilling. Prospecting with core drills guided by geophysical maps effects a great saving in expense, time and effort. - V. S.

7595. Lerici, C. M. Alcune considerazioni sull'avvenire della prospezione geomineraria (Some Considerations on the Future of Prospecting for Minerals in the Earth). Riv. Geomineraria, vol. 3, Nos. 3/4, 1942, p. 3.

A comparison is made between the State-controlled organization of geophysical exploration in Germany and the free-enterprise organization of such exploration in the United States and Canada. The role of the Government in the planning and execution of large programs of geophysical surveying is discussed. Attention is then devoted to specialization in various branches of geophysics, the improvement of instruments, the choice of personnel, and the future of geophysical exploration. - V. S.

7596. Montana Oil Journal. Geophysics Aids Wildcatters. Great Falls, Mont., vol. 24, No. 9, 1944, p. 4.

F. H. Lahee has reported to the convention of the American Association of Petroleum Geologists that 17 percent of the 3,843 wildcat wells drilled in 1943 were productive. When geophysics played a part in locating wildcats, 21.4 percent of the wells were productive; when geology had a part, 18.0 percent were productive. It should be kept in mind, in appraising these figures, that the geologists use geophysics, and the geophysicists use geology in their work. - V. S.

7597. Pospelov, P. A. A Combined West-Siberian Geophysical Expedition Searches for Oil (in Russian). Razvedka Nedr, Moscow, vol. 10, Nos. 10-11, 1940, p. 73.

The main West Siberian oil fields are listed, and the utterances of prominent men favoring geophysical exploration of this region are cited. The sending of an expedition in 1939 is described. Its purpose was principally to outline the relief of the deep-set Paleozoic covered with heavy younger sediments and to make all preparatory work for the drilling of 3 or 4 structures. The areas assigned comprised the districts of Sverinogolovsk, Petropavlovsk, Gankino, and Tavda. The work included gravimetric, seismic, magnetic, and electrical measurements. The main results were the determination of a number of Paleozoic structures. Most promising among them are the structures at Assanovo, Gankino, Riavkino, and Tavda. - V. S.

598. Ramirez, J. E. El instituto geofisico de los Andes Colombianos (The Geophysical Institute of the Colombian Andes). Rev. Acad. Colombiana de Ciencias Exactas, Fisicas y Naturales, Bogota, vol. 5, N. 19, 1943, pp. 361-366.

This account on the Geophysical Institute at Bogota, Colombia, describes he inauguration of the institute, the seismological station and its instruents, the meteorological observatory, the objectives and importance of the ork, and the results obtained during April - September 1943. - V. S.

599. Rowe, R. C. Finding a Hidden Ore Body. Canadian Min. Jour., Gardenvale, Quebec, vol. 66, No. 1, 1944, pp. 5-9.

The Aldermac Copper Corporation has found an ore body in the Eastern ownships, Quebec Province. This is the first Canadian discovery of a uried ore by combined geophysical and geologic methods. In 1942 a geoogical map was prepared of the fault zone between the Eustis mine and the edon mine. Certain areas were then selected for detailed geophysical exloration. The self-potential method was used for the initial reconnaissance raverses and the resistivity method for checking anomalies. In Ascot Townhip a strong anomaly was encountered, but there was no surface outcrop. An foot-deep trench gave only rusty schist, but a shallow diamond drill hole nowed a complex ore composed of chalcopyrite, sphalerite, galena, and pyrite, arrying gold and silver. In other selected areas, schisted zones were disovered to blend into a graphitic slate ill-fitted to the self-potential ethod. A gravimeter was brought in for determining whether anomalies deected by electrical methods were due to a graphitic shale or a sulphide ody. - V. S.

600. Sidwell, Raymond. Aid of Sedimentary Petrology to the Discovery of Oil. Jour. Sedimentary Petrology, Tulsa, Okla., vol. 13, No. 3, 1943, pp. 112-116.

The importance of sedimentary petrology to the discovery of oil is reflected in its wide utilization by the oil companies. It is the source of umerous criteria which constitute the basis for subsurface correlation. he study of sediments is considered paramount for the determination of orosity, for successful acidizing, and for information that can be used t the time of drilling. - Author's abs.

601. Stearn, N. H. Birth of the Science of Exploration Geophysics: 1944. Min. and Met., New York, vol. 25, No. 449, 1944, pp. 262-263.

The development of techniques for the discovery of natural resources is riefly outlined. At first, prospectors were guided by surface indications; hen the assistance of geology was sought. When the usefulness of these ids was largely exhausted, the prospectors turned to scientific instruments ith which to probe beneath the surface of the earth. So far the application

of these instruments has been to a considerable extent a groping process, similar to the gestation periods in other experimental sciences. But now the time is approaching when the accumulated body of tested knowledge will crystallize into an organized science of exploration geophysics. Three main results should be expected from this new science: (1) Search for natural resources; (2) devising improved tools and methods; and (3) development of a body of knowledge in keeping with growing demands. - V. S.

7602. Subkow, Philip. Geometrical Orientation of Cores. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 5, 1944, pp. 79-88.

Information on the direction and dip of formations is valuable in numerous problems; 10 problems are cited. Several methods have been suggested for determining the subsurface dip: Orientation of core barrels, magnetic orientation, and combined electrologging and coring. A new method is now presented which depends upon the geometric properties of deviated cores. Two cores must be taken in the formation surveyed. The direction and inclination of these cores and the apparent dip of the core stratum must be known. The core axes should differ either in direction or in inclination, or in both. Then three steps are necessary: (1) Both cores are oriented by placing the core axes in their original directions; (2) each core is further rotated about its axis until the core strata of both cores are parallel; and (3) finally, the direction and dip of the core strata are determined for this parallel position. The underlying geometrical principles are explained, and two examples are discussed. A special apparatus serves for orienting cores. Drawings of curves and pictures of the apparatus illustrate the text. - V. S.

7603. Wir, S. M. Geophysical Exploration in Poland. Geophysics, Menasha, Wis., vol. 9, No. 2, 1944, pp. 143-159.

Geophysical exploration in Poland started in 1923 and continued until 1939. The work during 1923-37 has been described by Z. Mitera (see Geophys. Abs. 95, No. 4703). The present paper amplifies information on seismic exploration during 1934-37 and describes the activities during 1938-39.

(1) The seismic work of 1934-37 was made in the foreland area divisible into the northern belt adjacent to the Podolian plateau, the median folded belt, the southern belt adjacent to the Carpathian Mountains, and the Carpathians themselves. The parties were equipped with American-made geophone sets. The surveys gave a contour map of the marker bed formed by gypsum, anhydrite, and limestone of Cretaceous age, throughout most of the area of the foreland.

(2) The geophysical exploration of 1938-39 included seismic surveying by refraction and reflection methods in the Carpathian Mountains, Carpathian foreland, and parts of northwestern and central Poland. The other work consisted of magnetic and gravimetric surveys; the latter used mostly Thyssen gravimeters. The area surveyed and the number of stations established are indicated. - V. S.

9. NEW PUBLICATIONS

504. Bock, R. Praxis der magnetischen Messungen (The Practice of Mangetic Measurements). Verlag Gebrüder Borntträger, Berlin, 1942.

For a long time magnetic measurements have been used in the search for ron. After the First World War, however, the application of magnetic exloration was much broadened. Entire regions were covered by magnetic rveys because they yielded information valuable in numerous problems, escially in conjunction with gravimetric data. The present book is written th a view to this wider application of magnetic methods. It assembles all owledge useful for making magnetic measurements. The exploration geophysist will find particular interest in the chapters devoted to the magnetic riometer of Schmidt; they provide information sufficient for field work. e text is supplied with many tables aiding magnetic determinations. - V. S.

505. Carnegie Institution of Washington. Year-Book No. 42, July 1, 1942 - June 30, 1943. Washington, D. C., 1943, 208 pp.

The Year-Book No. 42 of the Carnegie Institution compriese two reports n geophysical work:

(1) Geophysical Laboratory, L. H. Adams: Customary activities have en discontinued, and all efforts have been applied to the war. This work s carried out under contracts between the Institution and the Office of cientific Research and Development. During the last year the program has een expanded. At the same time, a few papers were published on the previous ork of the laboratory; abstracts of these papers are included.

(2) Department of Terrestrial Magnetism, J. A. Fleming: The services f the Department have been largely devoted to military work. They have exanded with the progress of the war. Many results obtained in connection ith the war will have a great peacetime value. The past year has emphasized he increasing importance of the observatories for various investigations. ost ordinary work was maintained, at least in part, so that the loss of ontinuity in accumulating data is not too serious; regrettably, cruises f the British Admiralty magnetic survey vessel "Research" had to be discontinued. The outline of the year's work covers the following fields: (1) osmic relations; (2) geomagnetic investigations; (3) terrestrial electricity; 4) ionosphere, (5) nuclear physics; (6) observatory and field work, and 7) miscellaneous. - V. S.

606. Coast and Geodetic Survey, U. S. Department of Commerce. Progress Report on Strong-Motion Earthquake Work; January, February, March, 1944. MSP-48, Washington, D. C., 1944, 2 pp.

A report is made on the following activities:

(1) Seismological field survey: San Francisco Office's questionnaire rogram; strong-motion work; vibration work; listing of principal earthquakes.

(2) Lake Mead seismological party: Servicing seismographs, determination of epicenters, etc.

(3) Washington Office: Furnishing information on earthquakes to various agencies, work on special projects, analysis of accelerograms, etc. - V. S.

7607. Coulson, C. A. Waves, A Mathematical Account of the Common Types of Wave Motion. New York, Interscience Publishers, Inc., 1943, 156 pp. Price, $1.75.

An elementary analysis is given of the following types of wave motion: (1) Waves on strings, (2) waves in membranes; (3) longitudinal waves in bars and springs; (4) waves in liquids; (5) sound waves; and (6) electrical waves.

In almost every case the fundamental problem is to solve the standard equation of wave motion; the various applications differ chiefly in the conditions imposed upon the solutions. For this reason, the treatment of waves is made as unified as possible. A special chapter deals with the equation of wave motion proper. At the end, general consideration is devoted to related problems, such as Doppler effect, amplitude modulation, group velocity, motion of wave packets, retarded potential theory, etc. - V. S.

7608. Doetsch, Gustav. Theorie und Anwendung der Laplace-Transformation (Theory and Application of the Laplace Transformation). New York, Dover Publications reproduction Julius Springer's 1937 ed., 454 pp., 18 ills. Price, $3.75.

This book gives the theory and applications of the Laplace transformation method. The material, selected from several fields, is presented for the first time in a unified form.

(1) The theoretical part covers the general theory and histroy of the Laplace transformation, fundamental conceptions of function theory, definitions and analytical properties, L-functions, inversion formulas, representation of operations, mapping of series developments of particular functions, transfer of series expansions, different types of asymptotic behavior of functions, integral equations, etc.

(2) The applications of the Laplace transformation comprise ordinary differential equations, partial differential equations, equation of heat conduction, telegraph equation and wave equation, potential equation, equations with variable coefficients, Huygens' and Euler's principles, etc. The book includes a German-English glossary. - V. S.

7609. Hart, C. A. Air Photography Applied to Surveying. New York, Longmans, Green & Co., 1943, 366 pp. Price $7.50.

Among the practical applications of the air survey the author lists geological prospecting. The air survey provides here a topographical map and enables the geologist to plot his observations directly on it. A system of faults, fractures, dykes, shear zones, etc., is frequently apparent in the photographs while remaining imperceptible to the closer observer. To interpret air photographs from a geological angle, it is necessary to view them geologically. The greatest value is obtained in the most difficult areas. The author deals with survey methods, interpretation, principles of photography, perspective, stereocopy, plotting, methods of leveling and countouring from air photographs, preparation of maps from photographs, stereoscoping instruments and plotters, small-scale mapping, flying, etc. Numerous photographs and diagrams illustrate the text. The war has greatly advanced air surveying. - V. S.

7610. Mathematical Tables Project, Work Projects Administration of the Federal Works Agency, U. S. A. Table of Reciprocals of the Integers from 100,000 through 200,009. Conducted under the Sponsorship of the National Bureau of Standards; A. N. Lowman, technical director. New York, Columbia University Press, 1943, 201 pp. Price $4.00.

Tables of reciprocals of the integers are useful in computations with calculating machines because they make it possible to use mulitplication in performing an indicated division. The present table facilitates the interpolation of reciprocals by expanding tenfold the scope of the existing tables in the interval from 100,000 through 200,009. A list of the other publications of the Mathematical Tables Project is appended. - V. S.

7611. Mathematical Tables Project, Work Projects Administration of the Federal Works Agency, U. S. A. Tables of Circular and Hyperbolic Tangents and Cotangents for Radian Arguments. Conducted under the Sponsorship of the National Bureau of Standards; A. N. Lowman, technical director. New York, Columbia University Press, 1943, 410 pp. Price $5.00.

The main table of this volume is devoted to the circular and hyperbolic tangents and cotangents for radian arguments ranging from 0 to 2 at intervals of 0.0001. Supplementary tables for all four functions over the range from 0 to 10 at intervals of 0.1 are also included. The entries are given generally to eight significant figures. Introductory remarks deal with the method of computation, direct interpolation, and inverse interpolation. A comprehensive bibliography is included. The present tables are a companion volume to the Tables of Circular and Hyperbolic Sines and Cosines. - V. S.

7612. Rinehart Oil News Co. of Oklahoma. Rinehart's Yearbook, 1944. Tulsa, Okla., Rinehart Oil Report Publication (mim.), 1944. Price, $5.00

The Rinehart's Yearbook of 1944 covers the oil developments that took place during 1943 in the following 15 States: Kansas, Oklahoma, Texas, New Mexico, Louisiana, Arkansas, Mississippi, Nebraska, Missouri, Iowa, North Dakota, South Dakota, Georgia, Alabama, and Florida. The new oil-pool discoveries are the main subject. In addition, the material is broadened in most cases to comprise such topics as reviews of development, analysis of exploration, new gas discoveries, oil production, cumulative production figures, extensions of old pools, etc., as well as local problems. The data include statistics and numerous maps. - V. S.

10. PATENTS

7613. Gun Perforator; Lloyd Spencer, Los Angeles, Calif., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware. U. S. Patent 2,331,057, issued October 5, 1943.

A gun perforator comprising: A plurality of gun units in the form of cylindrical disks having a greater diameter than thickness, said cylindrical disks being stacked axially, each gun unit having a laterally directed gun bore, and a longitudinally directed cartridge bore wholly open at one axial end, each cartridge bore being covered by the adjacent gun unit; means for securing said gun units together in a manner to withstand explosive pressures; and means defining passages connecting the cartridge bores of said gun units in series whereby the flame incidental to discharge of one gun unit is propagated to the succeeding gun unit. - Claims allowed, 20.

7614. Magnetic Field Responsive Device; D. W. Moore, Jr., New York, N. Y., assignor to Fairchild Aviation Corporation, a corporation of New York. U. S. Patent 2,331,617, issued October 12, 1943.

A magnetic field responsive device comprising, exciting coil means, a periodic wave supply circuit for said coil means, a pivoted magnetic armature disposed within the field of said coil means, said armature being balanced in the field of said coil means in the absence of an external field but subject to vibration in the presence of an external field having a component in a plane normal to said pivotal axis, and means responsive to vibration of said armature for giving an indication of said external field. - Claims allowed, 16.

7615. Time-Break Circuit; O. S. Petty, San Antonio, Tex. U. S. Patent 2,331,627, issued October 12, 1943.

A time-break circuit for seismic surveying comprising in combination a source of current, an iron core inductance and the bridge wire of a blasting cap connected in series, a recording galvanometer, a transformer connected in series with and associating said series circuit and said galvanometer, said circuit constants being such that the transformer output changes from a multiple to a derivative of the signal voltage supplied to the circuit at the time of firing of the cap. - Claims allowed, 7.

616. Seismic Surveying; F. C. Farnham, Rolla, Mo. U. S. Patent 2,340,314, issued February 1, 1944.

In a method of seismic surveying wherein a charge of explosive is detonated and the resulting seismic waves are detected and recorded, the steps which comprise, arranging the detectors in general alignment with the explosive charge, distributing the explosive charge in generally V-shaped alignment having the apex of the V pointed away from the detectors and having the alignment of detectors approximately bisecting the interior angle formed by the distributed explosive charge, adjusting the interior angle formed by the V-shaped explosive charge to render the vector component toward the detectors of the explosive propagation velocity approximately equal to the seismic wave propagation velocity inherent in the earth structure being surveyed, and initiating the explosion at the apex of the V-shaped distributed explosive charge. - Claims allowed, 5.

7617. Seismic Recording System; Conrad Reichert, San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,340,770, issued February 1, 1944.

Apparatus for the transmission by radio of a signal indicative of the instant of detonation of an explosive charge, to a plurality of remote receivers and recorders of radio, sound and seismic waves, comprising, in combination, a generator and transmitter of a radio wave of normally fixed frequency, means actuated with the detonation of the explosive to modulate said wave, a periodic bouncing mechanism normally restrained, means actuated by the firing of the explosive to release said mechanism, and means modulating said wave at each bounce. - Claims allowed, 8.

7618. Perforating Method and Apparatus; W. L. Kitsman, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,340,966, issued February 8, 1944.

In a method of the character described, the steps comprising disposing a plurality of firing mechanisms and corresponding explosive means at different elevations in a well bore, moving a device downwardly through the well bore and into engagement with at least one of the firing mechanisms, and actuating said one of the firing mechanisms upon further downward movement of the device to fire the corresponding explosive means without actuating at least one other firing mechanism that is located at a higher elevation sufficiently to fire the corresponding explosive means which is adapted to be fired upon predetermined actuation of said one other firing mechanism. - Claims allowed, 8.

7619. Gravity Meter; J. M. Ide, Alexandria, Va., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,341,323, issued February 8, 1944.

A gravity meter comprising a base provided with an upright member, a substantially horizontal beam weighted at one end, a resilient member connecting the other end of said beam to said base for pivotal movement about a horizontal axis passing through said resilient member at right angles to the axis of the beam, a coil spring attaching the weighted end of the beam to a point on said upright member located above said beam, said point and the weighted end of the beam being located on opposite sides of a vertical plane passing through the pivotal axis, the axial length of said coil spring when unstressed being equal to the distance between said point and said plane measured along a line drawn between the two attachment points, and means for observing the motion of the beam under the effect of the force of gravity. - Claims allowed, 6.

7620. Method for Determining the Nature of Formations Encountered in Well Drilling; Daniel Silverman and R. W. Stuart, Tulsa, Okla., assignors to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,341,745, issued February 15, 1944.

The method of determining the nature of a formation encountered during a well drilling operation, wherein a circulating fluid is employed, which comprises interrupting said drilling operation, forcing by reverse circulation a small amount of drilling fluid through the drill bit into the drill string above said bit, and testing, within said drill stem immediately above said drill bit, at least a portion of said small amount of drilling fluid for at least one property indicative of the nature of a substance present in the formation being penetrated by said drill bit. - Claims allowed, 1.

7621. Apparatus for Echo Distance Measurement; E. E. Turner, Jr., West Roxbury, Mass., assignor to Submarine Signal Co., Boston, Mass., a corporation of Maine. U. S. Patent 2,342,171, issued February 22, 1944.

In an echo distance measuring system, the combination of a recording device having a stylus arranged to be moved repeatedly across the record paper and to produce a mark thereon in response to an electric potential, a signal receiving circuit for producing a marking potential upon the receipt of a signal impulse, said receiving circuit including a push-pull amplifier of an odd number of stages both sides of which are balanced with respect to ground, said amplifier having input and output circuits, and means under the control of the operator for feeding back an amount of energy from the output of the amplifier to the input thereof sufficient for setting it into oscillation, whereby an electrical potential is produced for making a reference mark on the record paper. - Claims allowed, 1.

7622. Apparatus for Making Geophysical Explorations; H. M. Evjen, Houston, Tex., assignor to Nordel Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,342,626, issued February 29, 1944.

A system for electrical prospecting, comprising an earth-current circuit ncluding a source of direct current, a pair of spaced earth electrodes, and eversing means connected between said source and said electrodes for re- ersing the direct current at a predetermined controlled frequency whereby n earth current having a predetermined frequency is passed through the earth etween said electrodes, a potential circuit including potential pick-up elec- rodes located at spaced points lying within the field of influence of said arth current, a direct current indicating device connected to indicate the otential of said potential circuit, and reversing means synchronized with aid reversing means and connected between said potential pick-up electrodes nd said indicating device to convert the picked-up potential difference into unidirectional potential suited to actuate said indicating device, and oupling means connected between said earth-current circuit and said potential ircuit to impress on said potential circuit a balancing potential which is irectly proportional to the current flowing in said earth-current circuit at he instant of measurement, said coupling means comprising a motor generator ncluding a direct-current generator having a field winding connected in series ith said earth-current circuit and having an armature driven at substantially onstant speed by said motor, said generator being of the type supplying a urrent which is proportional to field excitation, and a potentiometer con- ected to be fed by said generator to develop a potential drop proportional to he current flowing in said earth-current circuit, said potentiometer being onnected in said potential circuit to apply thereto a potential drop opposing he potential picked up from said potential pick-up electrodes. - Claims llowed, 4.

623. Apparatus for Making Geophysical Explorations; K. H. Evjen and H. M. Evjen, Houston, Tex., assignors to Nordel Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,342,627, issued February 29, 1944.

A system for electrical prospecting, comprising an earth-current circuit ncluding a source of direct current, a pair of spaced earth electrodes, and eversing means connected between said source and said electrodes for re- ersing the direct current at a predetermined controlled frequency whereby n earth current having a predetermined frequency is passed through the earth etween said electrodes, a potential circuit including potential pick-up elec- rodes located at spaced points lying within the field of influence of said arth current, a direct-current indicating device connected to indicate the otential of said potential circuit, and reversing means synchronized with aid first reversing means and connected between said potential pick-up elec- rodes and said indicating device to convert the picked-up potential differ- ence into a unidirectional potential suited to actuate said indicating device, and coupling means connected between said earth-current circuit and said otential circuit to impress on said potential circuit a balancing potential which is directly proportional to the current flowing in said earth-current ircuit at the instant of measurement, said coupling means comprising a re- istance connected in series with said earth-current circuit on the direct- urrent side of said first reversing means to carry a predetermined portion of the current in said earth-current circuit and arranged to develop a potential

drop proportional to the current flowing in said earth-current circuit, a second resistor connected in said potential circuit on the alternating-current side of said second reversing means, an interrupter connected to produce from said potential drop an alternating current, a transformer having a primary connected to receive said alternating current, a rectifier connected to rectify the current induced in the secondary of said transformer, and a reversing means synchronized with said first reversing means connected to reverse said rectified current and to supply the same to said second resistor, whereby the potential drop in said second resistor corresponds in direction to the potential pick-up by said potential pick-up electrodes and is directly related to the total current flowing in the earth-current circuit at the instant of measurement. - Claims allowed, 3.

7624. Frequency Converter System for Geophysical Prospecting; W. B. Lewis, Houston, Tex., assignor to Nordel Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,342,676, issued February 29, 1944.

A system for electrical prospecting comprising an earth-current circuit including a source of alternating current of a given frequency, a pair of spaced earth electrodes, a frequency converter including a reversing means operating at a controlled lower frequency connected between said source and said electrodes for converting said alternating current to an alternating current of said controlled frequency whereby an earth current of said controlled frequency is passed through the earth between said electrodes, a potential circuit including potential pick-up electrodes located at spaced points lying within the field of influence of said earth current, a direct-current indicating device connected to indicate the potential of said potential circuit, reversing means synchronized with said first reversing means and connected between said potential pick-up electrodes and said indicating device to convert the picked-up potential different into a unidirectional potential suited to actuate said indicating device, and coupling circuits interconnecting said earth-current circuit and said potential circuit to impress on said potential circuit a unidirectional balancing potential which is directly proportional to the current flowing in said earth-current circuit at the instant of measurement, said coupling circuit comprising a transformer having a primary connected in the earth-current circuit on the higher-frequency side of said converter to receive alternating current from said source, a rectifier connected to the secondary of said transformer to rectify the induced potential, a resistor connected to receive rectified current from the rectifier and to there develop a potential drop proportional to the instantaneous current flowing in said earth circuit, and connections for balancing the potential drop in said resistor against the rectified picked-up potential. - Claims allowed, 2.

7625. Apparatus for Well Logging; A. L. Ackers, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,342,827, issued February 29, 1944.

Apparatus for locating a fluid interface, comprising means for heating fluids in which said apparatus is immersed, means for controlling said heatin

o maintain a substantially constant temperature, means for measuring a para-
eter of the energy input necessary to maintain said substantially constant
emperature, and means for raising and lowering said heating means and said
emperature control means. - Claims allowed, 8.

626. Apparatus for Making Geophysical Explorations; H. M. Evjen, Houston, Tex., assignor to Nordel Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,343,140, issued February 29, 1944.

A system for electrical prospecting, comprising an earth-current circuit ncluding a source of direct current, a pair of spaced earth electrodes, a otor-driven mechanical reversing switch connected between said source and aid electrodes for reversing the direct current at a predetermined controlled requency whereby an earth current having a predetermined frequency is passed hrough the earth between said electrodes, a potential circuit including po-ential pick-up electrodes located at spaced points lying within the field f influence of said earth current, a direct-current indicating device con-ected to indicate the potential of said potential circuit, a second motor-riven mechanical reversing switch synchronized with said first reversing witch and connected between said potential pick-up electrodes and said indi-ating device to convert the picked-up potential difference into a unidirec-ional potential suited to actuate said indicating device, a coupling circuit onnected between said earth-current circuit and said potential circuit to mpress on said potential circuit a balancing potential which is directly pro-ortional to the current flowing in said earth-current circuit at the instant f measurement, said coupling circuit comprising a resistance connected in eries with said earth-current circuit to develop a potential drop thereacross roportional to the current flowing in said earth-current circuit, a second esistance connected in said potential circuit, a transformer having its primary onnected across said first resistance and a secondary connected across said econd resistance, a third motor-driven mechanical reversing switch connected etween said first resistance and said primary for periodically reversing the flux induced by said primary and thereby inducing an alternating potential in aid secondary, and a fourth motor-driven mechanical reversing switch operating n synchronism with said third reversing switch and connected between said econdary and second resistance for rectifying the secondary potential and onnected to supply a unidirectional current to said second resistance to evelop a potential drop therein opposing the picked-up potential and bearing definite relationship to the earth current at all times. - Claims allowed, 3.

627. Geochemical Prospecting; Leo Horvitz, Houston, Tex., assignor to E. E. Rosaire, Houston, Tex. U. S. Patent 2,343,772, issued March 7, 1944.

In the method of geochemical prospecting according to which soil samples re systematically recovered over an area to be investigated and subjected to treatment for the determination therein of the quantity of a constituent ignificant of the existence of subsurface deposits, the steps of separating the clay from the sand in the sample and analyzing the clay portion for the foresaid constituent. - Claims allowed, 2.

7628. Wall Scraper and Well Logging Tool; W. L. Church, Houston, Tex. U. S. Patent 2,344,598, issued March 21, 1944.

A device for taking samples from a well comprising a sample-receiving chamber having an inlet, a wall-scraping probe pivotally mounted relative to the wall of the chamber and movable to active or inactive positions and provided with a channel, means to move the probe to active position to engage the wall of the well bore, said probe being mounted relative to the inlet whereby to cause the wall formation to pass along said channel and through said inlet into the chamber, when the probe is in active position, upon longtudinal movement of the device in a well. - Claims allowed, 8.

7269. Method of Measuring Earth Potentials; Herbert Blasier, Arcadia, Calif. U. S. Patent 2,344,672, issued March 21, 1944.

The method of determining the potential difference between a buried metal structure and a point in the earth which includes placing a conductor in known capacitative relation with that point, connecting the conductor to the buried metal structure, and measuring the quantity of electricity that flows through the connection as a result of said potential difference. - Claims allowed, 9.

7630. Gun Perforator Device; C. H. Keplinger, Centralia, Ill., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,344,778, issued March 21, 1944.

The combination of a gun perforator adapted to be lowered into a well on a cable and to discharge projectiles into the walls of the well, and a bullet catcher adapted to receive the bullets which fail to penetrate the walls of the well and fall down by gravity, said bullet catcher comprising a receptacle having an open upper face and a perforated bottom, said receptacle being positioned below said gun perforator and attached thereto. - Claims allowed, 5.

7631. Subsurface Prospecting; D. G. C. Hare, Houston, Tex., assignor to Texaco Development Corporation, New York, N. Y., a corporation of Delaware. U. S. Patent 2,345,119, issued March 28, 1944.

The method of investigating the formation around a borehole which comprises lowering through the hole a source of gamma rays and neutrons, detecting the gamma rays scattered in the formation and returned to the hole to determine the density and atomic number of the formations surrounding the hole and simultaneously and separately detecting the neutrons scattered in the formation and returned to the hole to determine the presence in the formation of substances containing hydrogen. - Claims allowed, 6.

32. Geochemical Prospecting; R. T. Sanderson, Sierra Madre, Calif., assignor to Stanolind Oil and Gas Company, Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,345,219, issued March 28, 1944.

Apparatus for geochemical prospecting comprising a container, a mass of drocarbon sorbent in said container, said container being provided with enings to subject said sorbent to soil gases, a layer of a water removal agent disposed between said openings and said sorbent, separate layers of agents for the removal of acidic and basic gases disposed between said first-ntioned layer and said sorbent, and means for suspending said container in shallow well. - Claims allowed, 11.

633. Method of Seismic Prospecting; W. E. Pugh, Tulsa, Okla., assignor to Seismograph Service Corporation, Tulsa, Okla., a corporation of Oklahoma. U. S. Patent 2,345,288, issued March 28, 1944.

A method of seismic surveying that comprises the steps of dividing a raverse into equal intervals, locating in alternate intervals a plurality f equally spaced detecting stations to form alternate spreads, creating eismic waves at both ends of each spread and also at the far extremity of he adjacent interval at opposite ends of the spread, separately detecting t each spread the waves which have been so created at each point, amplifying nd recording the detected waves in coordination with time. - Claims allowed, .

634. Geophysical Prospecting; F. W. Lee, Owings Mills, Md. U. S. Patent 2,345,608, issued April 4, 1944.

A method in geophysical surveying, comprising the steps of (a) establishing a flow of electric current through the earth between two points, (b) measuring potentials from a third point intermediate the first two points to other points on a line transverse to the line connecting the first two points, (c) determining the relative magnitude and sign of the transversely measured potentials which reflect and thus indicate the presence and location of strike of subterranean strata, and (d) repeating steps a, b, and c in various orientations of current flow near the position at which a subterranean strike is indicated, until equality of magnitude, with opposite sign if magnitude is other than zero, establishes accurately the direction of strike. - Claims allowed, 18.

7635. Coring Apparatus; G. H. Fisher, Dewey, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,345,739, issued April 4, 1944.

In apparatus of the character described, the combination comprising a core receiving receptacle adapted to be lowered into a borehole, a housing, a drive head reciprocably disposed within the housing and connected to the core receptacle, a fluid-actuated hammer within the housing for imparting

a thrust to the drive head to urge the core receptacle into the formation at the bottom of the borehole, a conduit in the borehole for transmitting an actuating fluid at superatmospheric pressure into the housing, and means for actuating fluid from the housing. - Claims allowed, 9.

7636. Well Logging Method; W. M. Zaikowsky, Pasadena, Calif., assignor, by mesne assignment, to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California. U. S. Patent 2,346,203, issued April 11, 1944.

The method of borehole logging which comprises causing different portions of a fluid column to interact substantially simultaneously with corresponding formations at different levels of a borehole, thereby subjecting said portions to a change in characteristic in accordance with the nature of the corresponding formations, recovering portions of said fluid column from different levels of said borehole after interaction with the respective formations, while preserving in the individual portions indications of any such interactions, analyzing each of said portions with respect to changes in said characteristic to determine the natures of the formations present at different levels of said borehole. - Claims allowed, 13.

7637. Gun Perforation in Wells; E. F. Raymond, Wilmington, Calif. U. S. Patent 2,346,233, issued April 11, 1944.

A gun perforator for use in wells, comprising an elongated body movable downwardly along a cable lowered in the well in advance of the perforator, a plurality of gun units positioned in the body at right angles with the body axis and spaced at intervals longitudinally thereof, a firing member displaceable in a vertical direction within the body, and means contained in each of said gun units and coacting with said member to cause all of said gun units to be fired by movement of the member in said direction. - Claims allowed, 14.

7638. Seismic Surveying; J. D. Eisler, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,346,369, issued April 11, 1944.

An apparatus for seismic prospecting including a seismometer adapted to produce electric waves in response to seismic waves, an amplifier for said electric waves, and a recorder for recording the output of said amplifier, the improvement comprising an electric band pass filter interposed in said apparatus between said seismometer and said recorder, said filter being so designed and constructed that in the range of frequencies defined by said pass band the phase shift between output from said seismometer and input to said recorder varies substantially linearly with frequency in such a manner that the apparent phase shift at zero frequency is an integral multiple of π radians. - Claims allowed, 3.

639. Determination of Underground Strata; A. D. Garrison, Houston, Tex., assignor to Texaco Development Corporation, New York, N. Y., a corporation of Delaware. U. S. Patent 2,346,481, issued April 11, 1944.

A device for locating oil-bearing formations traversed by a borehole comprising a housing adapted to be lowered through the hole, a source of ultraviolet light in said housing, a quartz bar supported by said housing for conducting a beam of said light onto the formation walls, means in said housing for recording variations in fluorescence produced by said light on said walls, and a second quartz bar disposed to conduct said fluorescence from said walls to said recording means. - Claims allowed, 5.

640. Damping Device in Gravimeters; A. R. Lindblad, Stockholm, and J. D. Malmqvist, Boliden, Sweden, assignors to Bolidens Gruvaktiebolag, Stockholm, Sweden, a joint-stock company, limited of Sweden. U. S. Patent 2,346,593, issued April 11, 1944.

In a gravity meter adapted for use in measuring the force of gravity or small changes therein, comprising in combination a movable weighing body, a support for said weighing body, means for elastically securing the weighing body to the support and for counterbalancing the gravitational force component acting upon the weighing body, means for damping the weighing body, said means comprising at least two plates carried by the weighing body and at least two stationary plates secured to the support, and which are positioned at substantially exactly the same distance respectively from the stationary plates, all of said plates having uninterrupted plane surfaces and being of the same area whereby at least two narrow gaps are formed between the stationary plates and the plates carried by the weighing body, and whereby a fluid in the gaps will be acted upon by the moving plates to effect a damping of the weighing body, the plates forming one of said gaps being insulated one from the other and constituting elements of a condenser the capacity of which is a function of the displacement of the weighing body. - Claims allowed, 2.

7641. Method of Detecting Petroleum Deposits; P. F. Dougherty, Chester, Pa., and P. D. Barton, Phoenixville, Pa., assignors to Sun Oil Co., Philadelphia, Pa., a corporation of New Jersey. U. S. Patent 2,346,735, issued April 18, 1944.

The method of detecting subterranean deposits of petroleum which comprises collecting a sample of earth from a determined location, subjecting such sample to treatment and analysis adapted to determine the amount of water and the amount of low-boiling hydrocarbons present therein, comparing the said determinations and ascertaining the ratio between said amounts, and utilizing said ratio as an index of the proximity of the location from which said sample was obtained to deposits of petroleum. - Claims allowed, 3.

7642. Well Logging; E. E. Roper, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,346,789, issued April 18, 1944.

A method of determining information on the extent and contents of earth formations penetrated by a well, including the steps of measuring the penetrating radiation from said formations at a plurality of points in a zone in said well, determining the response of the apparatus used for measuring said penetrating radiation to varying amounts of potassium, and determining the relative amounts of potassium in said formation in said zone, whereby said measurements of penetrating radiation can be modified in order to eliminate the effect on said measurements of radioactive potassium. - Claims allowed, 6.

7643. Well Surveying Device; R. G. Piety, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,347,794, issued May 2, 1944.

A method of electrically logging a borehole comprising suspending an elongated electrode in the borehole to be logged, grounding a second electrode, setting up an electrical potential between the two electrodes whereby electric current flows between the two electrodes, suspending an exploring electrode in the well bore intermediate the ends of the elongated electrode and electrically insulated therefrom, simultaneously setting up an electrical potential between the exploring electrode and the second electrode, simultaneously moving the elongated electrode and the exploring electrode in fixed relation thereto along the borehole, and simultaneously measuring the current flowing between the exploring electrode and the second electrode as the exploring electrode moves along the borehole. - Claims allowed, 8.

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MARCH 1945

UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

INFORMATION CIRCULAR

GEOPHYSICAL ABSTRACTS 119

OCTOBER - DECEMBER 1944

WITH AN INDEX TO ABSTRACTS 116-119

COMPILED BY

W. AYVAZOGLOU AND V. SKITSKY

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 119
OCTOBER - DECEMBER 1944[1]

Compiled by W. Ayvazoglou[2] and V. Skitsky[2]

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FOREWORD

Geophysical Abstracts 1 - 86 were issued in mimeographed form by the Bureau of Mines; Abstracts 87 - 111 were published as bulletins of the Geophysical Survey; Abstracts 112 - 118 were issued in mimeographed form by the Bureau of Mines as Information Circulars 7256, 7257, 7267, 7273, 7285, 7292, and 7303.

1. GRAVITATIONAL METHODS

7644. Barsch, O. Stellungnahme zum Bericht der Seismos G. m. b. H. über die Gravimeteruntersuchungen im Gebiet Varna (Note on the Report of Seismos, Ltd., Concerning Gravimetric Studies in the Region of Varna, Bulgaria). Jahrb. Direktion Bodenschätze in Bulgarien, pt. A, vol. 1, 1941, p. 45.

The author discusses the report of Seismos Co. on gravimetric surveys in the region of Varna, Bulgaria (Geophys. Abs. 118, No. 7516). The minimum zone of the Dobri-Dol is regarded as the deepest gravity belt between the elevations of Momino and the area of Varna, Prisolci-Gor, and Blizanak; the younger rocks probably possess the greatest thickness here. The significance

1/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7310".

2/ Physical science analytical editor, Bureau of Mines, U. S. Department of the Interior.

of the gravity break at Venelin - Aksakovo is stressed as an indication of oil. Further gravimetric studies in Bulgaria are recommended, and a program for them is offered. - V. S.

7645. Bullard, E. C. The Earth's Gravitational Field. Endeavour, London, vol. 2, No. 7, 1943, pp. 105-108.

The nature of the force of gravity, its variations, and the methods of measurement are discussed briefly. Studies of gravity provide information about the distribution of heavy and light rocks and explain various geological processes, such as mountain building. These studies have led to a remarkable development of gravitational measurements on the ground and at sea. As a result, the earth's gravitational field has been widely explored, but it is still not fully known. Isostasy seems to furnish an explanation of the known facts. During the last 10 years a tendency has been developing toward a closer connection between these geophysical studies and traditional geology. - V. S.

7646. Chella, Morio, and Solaini, Luigi. Apparato per la registrazione fotografica nelle misure pendolari di gravità (An Apparatus for the Photographic Registration of Pendulum Measurements of Gravity). Ric. Sci. Progr. Tecn., Rome, vol. 13, 1942, pp. 683-697.

Describes a photographic recorder of pendular measurements of gravity. A lamp directs three beams to three mirrors fastened, respectively, on a vibrator making 120 oscillations per second, a receiver of hourly signals, and a pendular system. The beams reflected from the mirrors fall on a photographic ribbon moving at a rate of 6 or 12 cm. per second. A photographic record is made of these beams at the beginning and at the end of each hourly signal, which lasts 5 minutes. From these records is calculated the number of oscillations occuring during a definite period of time, such as 2 hours. The accuracy of measurements has been tested at Milan and Pisa. The data are presented. They show that the oscillator has a precision of the order of about a thousandth of a sec.; the pendulum oscillations can be computed from the records with an average error of $\pm 4 \times 10^{-4}$ sec. - V. S.

7647. Goudey, Raoul. Mesures de l'intensité de la pesanteur dans le sud-ouest de la France pendant l'année 1941, effectuées en mars-août 1941 (Measurements of the Intensity of Gravity in Southwest France During the Year 1941, Carried Out in March-August 1941). Compt. rend. Acad. Sci., Paris, vol. 215, 1942, pp. 298-299, 342-344.

Gravity measurements were made in the southwest of France during 1941. Two Holweck-Lejay pendulum instruments were used. Toulouse served as base station, with $g = 980.437$ cm./sec.^{2} The calculation of the Bouguer correction was based on the international formula for a uniform density of 2.67. The altitude of stations was determined barometrically, with a possible error of 5 meters. The data are tabulated. - V. S.

548. Govorova, L. A., and Tovchigrechko, S. S. An Experiment in Rapid Determination of Gravity (in Russian). Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros'emki i Kartografii GUGK pri SNK SSSR, Sbornik 7, Issledovaniia po Gravimetrii, Moscow, 1941, pp. 29-48.

Gravimeters with shorter operating times tend to supplant the pendulum or gravity determinations, but the latter preserves its importance in measurements of great precision. The present paper describes field tests of the method of L. V. Sorokin for shortening the time of pendulum observations. In his method the signals from pendulum gravimeters used in field observations are checked not against the readings of the usual portable contact chronometer but against the direct time signals received with a resonance apparatus from the main pendulum of the astronomical clock of the nearest first-class observatory. In the described tests, the time service at the Pulkovo observatory has relayed the signals from a set of several intercompared clocks, through a specially constructed apparatus. The precision of time determinations was of the order of ± 0.002 second. The paper describes the instrumental arrangements, the field observations, and the results. The tests have proved that the method of Sorokin gives a precision equal to that of the usual procedure but requires less time. - V. S.

549. Haalck, H. Die örtliche Verteilung der ersten drei vertikalen Differentialquotienten W_z, W_{zz}, und W_{zzz} des Schwerepotentials in dem Messgebiet von Heide in Holstein (The Local Distribution of the First Three Vertical Differential Quotients W_z, W_{zz}, and W_{zzz} of the Gravity Potential in the Heide Survey District, Holstein). Beitr. ang. Geophys., Leipzig, vol. 10, 1943, pp. 121-129.

The variation with depth of the gravity acceleration and of its first two derivatives was determined in the Heide survey district, Holstein. The results were indicated on a map of isanomalies. A comparison was then made between this method of representation and the usual mapping of gradients and curvatures derived from torsion-balance measurements. It was found that the first representation is more helpful for interpretation than gradients and curvatures. In all, the gravity acceleration and its derivatives explore the same structures. But the acceleration characterizes more particularly the deeper layers; the first derivative, the intermediate layers; and the second derivative, the superficial layers. - V. S.

650. Hersey, J. B. Gravity Investigation of Central-Eastern Pennsylvania. Bull. Geol. Soc. America, Baltimore, Md., vol. 55, No. 4, 1944, pp. 417-444.

In 1940 and 1941, 712 gravity stations were established in central-eastern Pennsylvania over a region centering about Allentown and Bethlehem. Geologically the area extends from the Triassic lowlands to the Silurian of Kittatinny Mountain. Bouguer anomalies were computed, and from them gravity contour maps were made of the whole area and certain localities in it. Anomaly variation over the area is found to be both regional and local, the local

anomalies correlating in shape with structural trends and in several cases coinciding geographically with outcropping density contrasts that reasonably account for the gravity anomaly. Rough analysis is made of some of the structures, indicating the possible shape and size of mass anomalies that could produce the gravity anomalies found. Considerable overlapping of local effects makes detailed analysis difficult, but it is believed that the continued use of the gravimetric method in this region will be useful in studying its geologic and structural problems. - Author's abs.

7651. Horton, C. W. Gravity Anomalies Due to Extensive Sedimentary Beds. Bull. Geol. Soc. America, Baltimore, Md., vol. 55, No. 10, 1944, pp. 1217-1228.

Isostatic anomalies result from various two-dimensional structures such as large sedimentary basins and geosynclines. It is shown that a basin should be surrounded by a "halo" of positive anomalies and that the areal extent of the sedimentary layers and the dip of the lower contact are more important than thickness in producing the isostatic anomaly. The computations are applied to a coastal plain to interpret Vening Meinesz' findings that on many offshore profiles the anomaly increases algebraically away from the coast. Considerable computations are necessary before one can determine the amount of time lag between the deposition of sediments and the attainment of complete isostatic compensation. - Author's abs.

7652. Jung, Karl. Die Schwerewirkung von Störungsmassen und ihre Veranschaulichung auf der Einheitskugel (The Gravity Effect of Disturbing Masses and Its Demonstration on a Unit Sphere). Ztschr. Geophys., Braunschweig, vol. 17, 1942, pp. 276-278.

The derivation of formulas for the gravity effect of flat, horizontal layers is clarified by the application of a simple method which makes use of a unit sphere and does not require much mathematical knowledge. - V. S.

7653. Malamphy, M. C., and Vallely, J. L. Geophysical Survey of the Arkansas Bauxite Region. Geophysics, Menasha, Wis., vol. 9, No. 3, 1944, pp. 324-366.

Magnetic and gravimetric surveys were conducted by the Bureau of Mines over an area of approximately 1,400 square miles in the bauxite district of central Arkansas. The primary purpose of these surveys was to discover any possible buried and hitherto unknown syenite masses favorable for the occurrence of bauxite and to determine the approximate position of the buried flanks of the known syenite masses that might offer conditions favorable for the discovery of new ore bodies. These surveys indicated that the various syenite outcrops are domes or bosses on a large batholith and that other similar domes occur on the batholith but do not outcrop. Drilling on the local geophysical anomalies proved the presence of 10 buried domes, but only 2 were found to project above the upper surface of the Midway clays, a

quisite of conditions favorable for the occurrence of bauxite ore bodies. c geophysical data indicated the approximate configuration of the buried anks of the known syenite outcrops, and the portions of these flanks that oject above the Midway have now been outlined more accurately by drilling. e geophysical surveys have produced evidence permitting the elimination of large area as unfavorable for the occurrence of bauxite.

Magnetic surveys extending along the Midway-Wilcox contact from Gurdon Clark County on the southwest to Searcy in White County on the northeast ve proved the improbability of the existence of other syenite masses simi- r to those found in Pulaski and Saline Counties. A detailed magnetic sur- y of the Magnet Cove area in Hot Spring County has proved that the syenite ss exposed in that locality is an isolated intrusion and entirely unrelated those of Pulaski and Saline Counties. This syenite mass does not occur der conditions believed to be favorable for the occurrence of bauxite. - thors' abs.

654. Niemczyk, Oskar, Ed. Spalten auf Island (Fissures in Iceland). Verlag von Konrad Wittwer, Stuttgart, 1943, 160 pp. Price, 16.50 RM.

In 1938 a German expedition explored the fissures of Iceland. Geodetic, eological, and gravimetric methods were applied. The gravimetric work was ntended to initiate an investigation of the subsurface. Eight basic stations ere established with a four-pendulum apparatus by E. Ansel. Secondary sta- ions were covered with the Thyssen gravimeter; the measurements made at 40 tations by A. Schleusener of the Seismos Co. had an average error of ± 0.29 gl. The gravity anomalies, obtained after making the Free-Air and Bouguer eductions, are discussed in the light of the international gravity formula f 1930. Further gravimetric surveying in Iceland is recommended. - V. S.

655. Peacock, H. B. The Geophysical History of the Cayuga Field, Anderson County, Tex. Geophysics, Menasha, Wis., vol. 9, No. 3, 1944, pp. 299-313.

Original seismic maps based on the correlation method of reflection hooting are presented, together with a geological structure map. Cross sec- ions show a comparison of the seismic with the well data. Results of a ravity-meter survey are also shown. - Author's abs.

656. Scheffer, V. Sull' impiego dei gravimetrii in zone montagnose (On the Application of the Gravimeter to Mountainous Terrain). Riv. italiana petrolio, vol. 20, No. 4, 1942.

This paper describes field work with a Boucher gravimeter in mountainous ountry, the transportation of the instrument, the problems created by ariations in altitude, and the topographic corrections. - V. S.

7657. Thyssen, S. von. Über den Einfluss der durch den Wasserhaushalt hervorgerufenen Inhomogenität des Erdbodens auf Schweremessungen (Concerning the Influence Exerted on Gravity Measurements by the Ground's Inhomogeneity Created by Water Content). Beitr. angw. Geophys., Leipzig, vol. 10, 1943, pp. 185-202.

The factors determining water content in the ground were investigated with precision. The results showed that the local and seasonal variations in such content can reach proportions at which they influence gravity measurements. Therefore, the condition of ground-water levels should not be overlooked in precise gravimetric surveys. - V. S.

7658. Vening-Meinesz, F. A. The Equilibrium Figure of the Earth and the Indirect Isostatic or Bowie Reduction. Proc. Akad. Wetensch. Amsterdam, vol. 45, 1942, pp. 611-618.

Spherical harmonic functions are applied in the derivation of new formulas for calculating the geoid-undulations and the Bowie gravity reduction. It is taken into consideration that the shift of masses connected with the isostatic reduction displaces not only the geoid but also the level surfaces of the core. Accordingly, additional reductions are necessary by means of which to determine the shifts at the principal layer boundaries. These boundaries are established at the lower edge of the earth crust at a depth of 800 and 2,900 km. The masses filling in the spaces between the geoid and the spheroid must be regarded as uncompensated. The calculations are carried out by applying the Hayford and Airy isostasy formulas. - V. S.

2. MAGNETIC METHODS

7659. Bernstein, Arthur. A Survey of Methods of Constructing Magnetic Charts. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 3, 1944, pp. 169-179.

No uniformity exists in the methods of constructing magnetic charts. The tracing of contours is largely guided by individual judgment. The present survey of the literature on methods is made with a view to remedying this situation. Attention is centered on descriptions of the schemes of interpolation used in locating the isomagnetic lines. The discussion covers the charts of various countries and related problems, such as proposed methods of representation, geometry of magnetic charts, choice of map projection, and suggestions for improving representation. - V. S.

7660. Coulomb, Jean. Partie principale de l'ensemble du champ magnétique terrestre et composante verticale locale (The Principal Part of the Total Terrestrial Magnetic Field and the Local Vertical Component). Comptes rendus Acad. Sci., Paris, vol. 216, No. 13, 1943, pp. 452-453.

P. Rougerie has used in his work on terrestrial magnetization the local gnetic constant "G" of L. A. Bauer. This constant corresponds to a uniform gnetization of the globe as computed from the data of a single station. The thor points out that the principal part of the terrestrial magnetic field ould be attributed to the radial magnetization of a superficial stratum of e earth. He derives a mathematical equation of the relationship between e values of uniform magnetization derived from one station, radial magneti- tion of superficial stratum, and the vertical magnetic component Z. This uation shows that the vertical magnetic component Z has a meaning wholly alogous to that of the local magnetic constant "G" of Bauer. Several con- derations are further given in support of radial magnetization. The secular riations of Z are approximately proportional to the magnetization of a stra- m which would produce the general secular variation. Vestin's map of cular variation resembles closely the map of izopores of Z. - V. S.

661. Ehrenhaft, Felix. New Experiments About the Magnetic Current (Abs.). Phys. Rev., Lancaster, Pa., vol. 65, Nos. 1-2, 1944, pp. 62-63.

The author summarizes his latest work: Experimentally we have established he existence of magnetic currents in our discovery of magnetic ions, magne- olysis of water, and the electric field around magnetic currents. The follow- ng is a continuation of these experiments. In the dark field we observe that icroscopic test bodies (for example, chromium, manganese, nickel) move in piral paths or parts of spirals around a constant, vertical, homogeneous, agnetic field in air of atmospheric pressure, created in a magnetic condensor. n dilute copper-sulfate solution blue-light-scattering particles of colloidal ize become visible in the dark field between the aforesaid magnetodes. Each ingle colloid particle spirals up or down around the constant homogeneous ertical magnetic field, ending its movement on the upper or lower magnetode. hese are the well-known copper particles that precipitate on iron. The de- cribed experiments in gases and liquids prove clearly the existence of bodies harged simultaneously electrically and magnetically. Because of their elec- ric charges they move around the magnetic field along the electric force ines closed in circles. Because of their magnetic charges, north or south, hey move upward or downward. The helix is the resultant path. (A bibliograph of previous works is included. - V. S.).

662. Galmarini, A. G. Recent Geomagnetic Work and Plans of the Direccion de Meteorologia, Geofisica, e Hidrologia, Republica Argentina. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 2, 1944, p. 131.

An isogonic map of Argentina was recently published by the Direccion de Meteorologia, Geofisica, e Hidrologia. It embodies the results of the magneti survey for epoch January 1, 1944. Subsequent field work includes complete observations at 178 points. The Direccion proposes to publish isodynamic maps of horizontal and vertical force and an isoclinic map. - V. S.

7663. Johnston, H. F. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for January to June, 1944. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, Nos. 2-3, 1944, pp. 103-106, 181-184.

Tables and graphs are given with explanatory text. - V. S.

7664. Kendall, J. T. "Magnetic" Current. Nature, London, vol. 153, No. 3875, 1944, pp. 157-158.

The author has repeated two experiments of Ehrenhaft with a view to testing his conclusions on the existence of a magnetic current.

(1) When iron pole pieces of an electromagnet were immersed in hydrochloric acid, a steady stream of liquid was observed from the pole faces into the center of the gap, as Ehrenhaft had reported. But this movement is explained as due to the action of the strong, nonuniform magnetic field upon the concentration of paramagnetic ferrous ions. No movement occurred when potassium chloride or cadmium sulfate was used as solution. In another test, the pole pieces were heavily plated with cadmium and were then immersed in dilute hydrochloric acid. Bubbles of gas were liberated as before, but their motion in the liquid was entirely unaffected by the magnetic field.

(2) Ehrenhaft's observation that oxygen is evolved at the north pole and hydrogen at the south pole was likewise confirmed. Namely, it was found that the north pole showed 0.54 percent of oxygen and the south pole 0.49 percent of oxygen. However, this small difference is explained by the heating of the pole pieces (due to the current in the magnetizing coils) and the presence of air dissolved in the acid. The author reserves final judgment until a fuller account of Ehrenhaft's experiments is available. - V. S.

7665. Lauterbach, Robert. Geophysikalische Untersuchungen an der Roteisenvorkommen des Lahn-Gebietes (Geophysical Surveys of Hematite Occurrence in the Lahn District). Gerlands Beitr. Geophys., Leipzig, vol. 59, 1942, pp. 191-200.

Magnetic surveys of hematite ore were undertaken in the Lahn district, in completion of former work. They successfully differentiated between the magnetic anomalies caused by ore and the simultaneously appearing anomalies produced by diabases. The hematite deposits, in part newly discovered, were made thereby better amenable to further exploration. - V. S.

Malamphy, M. C., and Vallely, J. L. Geophysical Survey of the Arkansas Bauxite Region. Geophysics, Menasha, Wis., vol. 9, No. 3, 1944, pp. 324-366. (See No. 7653 of this issue.)

7666. Maurain, Charles. Sur les perturbations magnétiques à début brusque. Sens des débuts brusques (The Magnetic Disturbances with Sudden Onsets. Direction of Sudden Onsets). Compt. rend. Acad. Sci., Paris, vol. 217, No. 3, 1943, pp. 57-59.

The magnetic disturbances with sudden onsets (SC) have been previously tudied by the author with respect to their frequency and amplitude (see eophys. Abs. 118, No. 7529). A study is now presented on the direction of udden onsets. This direction is termed positive if it corresponds to an ncrease in the components H, Z, D; and vice versa. The results in the area f Paris showed that for H the SC are always positive; and for D, generally ositive. For Z, the SC had a negative direction at two observatories, and positive direction at one observatory. This discrepancy led the author to tudy the material of numerous observatories situated in different parts of he globe. It was found again that the SC are almost always positive for H. s regards Z and D, the direction depends generally upon the location; certain road regularities may be observed for large areas and for compass directions. V. S.

7667. Modriniak, N. Geophysical Investigation of the Puhipuhi Mercury Deposit. New Zealand Jour. Sci. and Technol., B. General Section, Wellington, vol. 26, No. 2, 1944, pp. 61-65.

The magnetic survey of the Puhipuhi Plateau outlined the irregular thickness of the basalt sheet; the distribution of vertical magnetic intensity shows in first approximation the surface relief of the graywacke covered by the basalt. The close connection of loss of magnetic properties in basalt to thermal activity was shown. The area near and west of anomaly No. 5 is most likely to contain ore. - Author's abs.

7668. Rooney, W. J. Summary of Earth-Current Records from Tucson, Ariz., for a Complete Sunspot-Cycle. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 3, 1944, pp. 147-157.

The final results of the cooperative project of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, the United States Coast and Geodetic Survey, and the Bell Telephone Co., for the measurement of earth currents at Tucson, Ariz., are summarized in eight tables. These tables give for each component yearly and monthly values of the mean diurnal variation as recorded on all days and on the 10 calmest days of each month. From the yearly values the general correlation between earth-current activity and solar activity, as indicated by sunspot numbers, is apparent. The monthly values confirm in detail a number of interesting and unusual features previously reported in connection with the seasonal variation in earth-current flow at Tucson. Since the records cover a full sunspot cycle and are quite complete and homogeneous, it is believed that they afford exceptionally useful material for further study of the relationship between magnetic variations, earth currents, and the conditions existing in the ionized layers of the upper atmosphere. - Author's abs.

7669. Strona, A. A. Magnetic Anomalies of Massalsk-Sukhinichi and the Problem of the Vertical Structure of Mid-Russian Highlands (in Russian). Sovetskaia Geologiia, Moscow, vol. 9, No. 2, 1941, p. 3.

Magnetic surveys made since 1934 revealed anomalies in the eastern part of the Smolensk Province. These anomalies generally formed a zone of varying width, some 120 km. in length, stretching in a NW.-N. direction. The zone consists of two sections which have a complicated structure. The southern section, 40 km. long, has a maximal anomaly $V_a max. = - 1.55 H_o$ in a SE. direction from Okhotnoe. The northern section has a maximal anomaly $V_a max. = -1.65 H_o$ near Sovgorsk. The causes of the anomalies may be strong pre-Cambrian formations containing magnetite, as is the case with the Kursk magnetic anomaly. From the structure of the anomalies conclusions are drawn as to the nature of the basement. - V. S.

7670. Terrestrial Magnetism and Atmospheric Electricity. Note: Magnetic Surveys in Airplanes by the U.S.S.R. T.M.A.E., Baltimore, Md., vol. 49, No. 3, 1944, p. 214.

In recent years attention has been called by various geophysicists to the advantages of magnetic surveys made from airplanes. Among these advantages are aids in geophysical prospecting, indications regarding depths of basic rock, and delineation of magnetic anomalies. In this connection it is of interest to recall a Russian pioneer effort in this direction. An experimental survey was carried out in June 1936, under the auspices of the Central Geological Research Institute of Leningrad, over the Starorusskaya magnetic anomaly on the Novgorod-Valday line. According to data of the Office of the General Magnetic Survey of the U.S.S.R., the vertical component of the earth's magnetic field varies here between 250 and 1,400 gammas over an extension of 60 km. The survey was made by A. A. Logachev, who used an instrument of his own construction (see Geophys. Abs. 87, No. 3282). - Condensed by V. S.

7671. Ting, S. L., and Lin, S. T. A Magnetometer for the Determination of the Vertical Component of the Earth's Magnetic Field. Rev. Sci. Instruments, Lancaster, Pa., vol. 15, No. 7, 1944, pp. 171-177.

The magnetometer consists mainly of two parts: A Helmholtz-Gaugain coil fixed on a horizontal divided circle for producing a uniform vertical magnetic field to balance the vertical component of the earth's field, and a magnet-balance system for observing the effect of the fields. The vertical component of the earth's field is determined in terms of the coil constants and the strength of the current passing through the coil. The error due to the horizontal component of the earth field and that due to the deviation of the center of gravity of the balance system from the rotating axis are eliminated, respectively, by taking the mean value of two observations with the axis of the balance set first in one direction and then turned into the opposite direction by rotating the whole instrument through 180° about a vertical axis, and by reversing the polarity of the balance. The special features of the instrument are as follows: (1) A pair of small solenoids is fixed inside the balance chamber and the balance can have its polarity reversed in its arrested position without being taken out; and (2) by providing another pair of horizontal coils on the chamber, the magnetometer serves at the same time as a galvanometer with the magnet balance as its moving magnet (the galvanometer is needed for the determination of the current and would otherwise be provided separately). By preliminary tests the instrument is found to give consistent results. Its sensitivity is about 1/2 minute per gamma. - Author's abs.

2. Warner, L. A. Iron Deposits of Kasaan Peninsula, Prince of Wales Island, Southeastern Alaska (abs.). Econ. Geol., Lancaster, Pa., vol. 39, No. 1, 1944, pp. 104-105.

There are high-grade deposits of magnetite containing some copper on aan Peninsula, Prince of Wales Island, southeastern Alaska. They have en worked intermittently since 1900, principally for their copper content. 1942 the Federal Geological Survey resumed a systematic study. Topographic, gnetic, and geologic surveys have been made at most of the deposits that ve been mined or prospected. - V. S.

3. SEISMIC METHODS

73. Angenheister, G. Bestimmung einer Grenzfläche durch Laufzeiten oder Richtungswinkel der reflektierten Wellen (The Determination of a Boundary Surface by Means of the Travel Time or the Angle of Direction of Reflected Waves). Ztschr. Geophys., Braunschweig, vol. 17, 1942, pp. 309-316.

A geological boundary surface is given which is plane and inclined; it is cessary to determine its dip and direction of strike. The data of seismic flection, such as travel times or emergence angles, can serve for this de- rmination. The author describes graphical and mathematical methods for such rpose. Since the spatial relationships in these problems are often diffi- lt to visualize, they are clarified by means of a model and a spacial agram (see No. 7736 in this issue). - V. S.

74. Biot, M. A. Analytical and Experimental Methods in Engineering Seismology. Trans. Am. Soc. Civil Eng., New York, vol. 108, Paper 2183, 1943, pp. 365-408.

Analysis of strong-motion earthquakes by the U. S. Coast and Geodetic rvey has made available a mass of data dealing with the actual ground motion aring an earthquake. The work of Professor Biot stems from this work and eals with the evaluation of earthquake stresses. The discussion is by eorge R. Rich, N. J. Hoff, Merit P. White, N. H. Heck, Frank Neumann, Jacob eld, George W. Housner, Homer M. Hadley, Robert E. Glover, and M. A. Biot. uch valuable information on the subject is contained in both the original aper and in the discussions. - N. H. Heck, Bibliography of Seismology, No. 14, 943, Dominion Observatory, Ottawa, 1944, p. 234.

675. Bodle, R. R. United States Earthquakes, 1942. U. S. Coast and Geodetic Survey, Washington, D. C., Serial 662, 1944, 38 pp.

Earthquake activity in the United States and regions under its jurisdiction is summarized for the year 1942 under the following headings: (1) oninstrumental results, (2) miscellaneous activity, (3) seismological observatory results, (4) strong-motion seismograph results, and (5) tilt observations. The text is illustrated by maps, tracings of accelerograph ecords, and tilt graphs. - V. S.

7676. Bureau of Mines, U. S. A. Federal Explosives Act. Washington, D. C., Government Printing Office, 1944, 55 pp.

In the present edition, the Federal Explosives Act of December 26, 1941 (55 Stat. 863), has been revised as of June 1, 1944. Together with the revision are published the Regulations Issued Under Federal Explosives Act and the Recommendations for Storing, Handling, and Transporting Explosives. - V. S.

7677. Daly, J. W. How to Make Velocity Corrections. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 28, No. 5, 1944, pp. 615-628.

The fundamental assumptions in regard to velocity distribution and the effect of these assumptions in the computation of reflection-seismograph data are discussed. Simple methods for adjusting reflection-seismograph information for lateral changes in vertical velocity are explained and illustrated. - Author's abs.

7678. Fisher, N. H. The Gazelle Peninsula, New Britain, Earthquake of January 14, 1941. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 1, 1944, pp. 1-12.

The earthquake of January 14, 1941, on Gazelle Peninsula, New Britain, is described with regard to general features, instrumental data, position of epicenter, surface effects, damage to property, tilting, seismic history, etc. Diagrams illustrate the text. - V. S.

7679. Gershánik, Simón. Resultados sismométricos del año 1935 (Results of Seismic Measurements in 1935). Observatorio Astronómico Universidad Nacional de La Plata, Serie Geofísica, vol. 6, No. 3, La Plata, 1941, 173 pp.

The results of seismological observations at the La Plata (Argentina) observatory in 1935 are reported under the headings of date, component, phase, hour, period, amplitude (apparent and absolute), character of P, and notes on phase and on epicenter. Subsidiary data are given on the instrumental constants (Focha, Mainka, Wiechert), the monthly and geographical distribution of earthquakes, the earthquakes with abnormal foci, and the maximal amplitudes observed. An introductory note deals with the location of the earthquakes. - V. S.

7680. Gutenberg, Beno. Travel Times of Principal "P" and "S" Phases over Small Distances in Southern California. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 1, 1944, pp. 13-32.

A study has been made of arrival times of the principal P and S phases in 50 of the larger earthquakes in southern California. The results on travel times and apparent velocities are presented. The average true velocities of

- and S_y are about one-third of 1 percent and those of P_n and S_n about one-
lf of 1 percent smaller than the corresponding apparent velocities. In
ie uppermost 50 km. the velocity increases with depth. The order of magni-
ude of this increase is roughly 1 percent per 10 km., but larger in the upper-
ost 1 or 2 kilometers. The curvature of the earth can be disregarded within
ie range of distances used (in general not exceeding 800 km.). - V. S.

581. Gutenberg, Beno. Energy Ratio of Reflected and Refracted Seismic Waves. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 2, 1944, pp. 85-101.

The investigation of amplitudes of elastic waves passing through layers
f the earth, either in earthquakes or from artificial explosions, requires a
nowledge of the distribution of energy at points of reflection or refraction,
nd also of the ratio between the amplitudes arriving at the surface of the
arth and the displacements of the ground there. Some fundamental theoretical
roblems involved are discussed, and typical curves for the quantities mentioned
re given. - Author's abs.

582. Hayes, R. C. Earthquakes in New Zealand During the Year 1942. Dominion Observatory, Bull. S.69, Wellington, 1944, pp. 191b - 194b.

This report gives a list of principal earthquakes in New Zealand during
942, with their dates, times, and maximum intensity. The distribution of
he epicenters of these earthquakes is indicated on a map. The most notable
eature of the map is the concentration of activity in the Wairarapa district.
he other remarkable features during the year were a shock with a focal depth
f 370 km., deepest so far recorded in New Zealand, and a shock in the south-
ast Tasman Sea where seismic activity occurs very rarely. - V. S.

683. Henderson, J. T. Earthquake Risk in New Zealand. New Zealand Jour. Sci. Technol., Wellington, vol. 24, No. 5B, 1943, pp. 195B-219B.

References are given to accounts of earthquakes felt in New Zealand sinc
uropean occupation. The topographical and geological evidences of still
arlier earthquakes are briefly sketched as well as relevant points of geolog-
al structure. From these factors the risk of earthquakes in different parts
f New Zealand is discussed. Next are described the wave motions of earth-
uakes and their effects on different kinds of ground, possible methods of
pproach to the problem of earthquake prediction, and how damage by earthquakes
ay be guarded against and reduced. - Author's abs.

684. Hodgson, E. A. Bibliography of Seismology. Publications of the Dominion Observatory, Ottawa, vol. 13, No. 15, 1944, pp. 253-267. Price, 25 cents.

The current issue of this periodical contains, as usual, numerous entries related to the seismic method of exploration and offers an interest to the geophysicists employing this method. - V. S.

7685. Jeffreys, H. H., and Bullen, K. E. Seismological Tables. British Assoc. Advanc. Sci., London, 1940.

The Royal Astronomical Society has published on different occasions various seismological tables of Jeffreys and Bellen. All of these tables are now reproduced in collected form. - V. S.

7686. Koridalin, E. A., and Masarskii, S. I. A Test of Deep Seismic Surveying (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 21-28.

In 1939 the Seismological Institute of U.S.S.R. made a seismic survey of the Moscow depression, the bottom of which is Pre-Cambrian. The purpose was to determine the depth of the crystalline basement and to differentiate the superposed sedimentary formation into its constituents. The geology of the region is described. Both reflection and refraction were used. The apparatus employed for refraction surveying was a new type of condenser-electroseismograph constructed in the laboratory of the Institute. It consisted of a vertical pendulum suspended on a spiral spring and connected with a differential condenser (see Geophys. Abs. 118, No. 7556). The model was tested in the laboratory under conditions approximating field work; it gave satisfactory seismograms at distances not exceeding 15 km. The velocities of seismic waves were determined for inclined boundaries primarily by means of successive hodographs. The question of hodographs is discussed for the Serpukhov and Shatsk districts. The schemes of successive and reversed hodographs employed in the work are described and exemplified by drawings. - V. S.

7687. Martin, H. Einschwingvorgang und Stossaufzeichnung (Initial Oscillation and the Recording of Impact). Physikal. Ztschr., Leipzig, vol. 43, 1942, pp. 222-226.

The author discusses oscillations caused by impact. At the outset the values of velocity, acceleration and displacement here equal zero. The following function, among others, can be used to represent this movement: $x = C\tau^n e^{-\alpha_1 \tau}$ for $n > 2$. The variation of this function and of its second derivative for different values of "n" are indicated on a graph. Theoretical considerations show that a seismograph equipped with optical magnification will record with precision the displacement expressed by this function when its proper period is sufficiently large in comparison with the time it takes "x" to reach its first maximum. On the other hand, the seismograph will record with precision the acceleration when its proper period is sufficiently small in comparison with the same time interval. Shaking-table tests have indicated that for a movement caused by impact the displacement and the acceleration vary in a similar way. - V. S.

688. Masarskii, S. I. Some Possible Conflicts in the Interpretation of Hodographs of Waves Refracted from a Three-Layered Structure (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 42-44.

The interpretation of hodographs is usually made on the basis of their irect and return records. These records give an identical interpretation nly in the case of structures with one dividing boundary. But in actual urveying there often occur many dividing boundaries. The customary prac-ice in such cases is to disregard the intermediate boundaries and to base nterpretation solely on the horizon investigated. This oversimplification eads to errors. The present paper analyzes the error made in one inclined oundary intervening between two horizontal boundaries. The equations for he direct and the returning waves show here a different inclination, even hough the last boundary is horizontal. If the intermediate horizon were isregarded, the interpretation placed on this difference between direct nd returning waves would be that the last boundary is inclined, which is rroneous. The discussion is illustrated by examples of special instances. - . S.

689. Montandon, Frederic. Les séismes de forte intensité en Suisse (The Seismisms of Strong Intensity in Switzerland). Revue pour l'étude des calamités, Genève, vol. 5, Nos. 18-19, 1942, pp. 107-169; vol. 6, No. 20, 1943, pp. 3-49.

The author describes the strong earthquakes in Switzerland classifiable under intensity-gradations VII-XII of the International Scale of Intensities, 1917. These classes include earthquakes producing marked damage to buildings. The description covers the IX-XX centuries. For each class of intensities there are indicated the corresponding accelerations according to Cancani and the principal seismic effects according to the international scale, the scale of Sieberg, and the American and Japanese scales. This description is accompanied by a discussion of seismic statistics, principal seismic regions in Switzerland, and comparative intensities of some Swiss and foreign earthquakes. An alphabetical list of earthquakes gives their location, year, and intensity classification. A bibliography on Swiss earthquakes covering 273 entries is included. - V. S.

7690. Ott, H. Reflexion und Brechung von Kugelwellen; Effekte 2. Ordnung (The Reflection and Refraction of Spherical Waves; Effects of 2d Order). Ann. Physik, Leipzig, vol. 41, 1942, pp. 443-466.

The author has analyzed mathematically the reflection and refraction of spherical waves. This investigation was made with reference to wave impulses sharper than usual, whether or not accompanied by dispersion. It showed the presence of a border wave ("Flunkenwelle") existing together with the usual reflected and refracted waves. This wave travels along the boundary surface with the velocity of the lower medium and radiates upward at the angle of total reflection. It has long been used in seismology, but is not yet explained satisfactorily. Such waves have been received by O. von Schmidt. - V. S.

Peacock, H. B. The Geophysical History of the Cayuga Field, Anderson County, Tex. Geophysics, Menasha, Wis., vol. 9, No. 3, 1944, pp. 299-313 (see No. 7655 in this issue).

7691. Popov, V. V. The Density of Distribution of the Epicenters of Earthquakes on the Territory of the U.S.S.R. (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 9-11.

A map of the density of epicenters of earthquakes in U.S.S.R. is presented. It has been prepared as follows: (1) A geographic map of U.S.S.R. was divided into sections formed by meridians and parallels at 5° intervals. A net of trapeziform subdivisions was thus obtained. (2) Inside each trapezium, along its sides, were plotted dots representing the number of epicenters in the respective locality. The bulletins of teleseismic stations of the U.S.S.R. for 1912-37 provided material; they supplied data concerning over 800 epicenters and covered the territory of the entire U.S.S.R. Relative density in different trapezia was indicated by shading them with different colors. This map revealed the following features: (1) In the Crimea, Caucasus, and central Asia the greatest number of epicenters is found in the zone between 35° and 45° northern longitude; (2) in the regions of the Lake Baikal and Kamchatka this number is found between 50° and 55° northern longitude. Significantly, the indicated zones correspond to the principal mountains of U.S.S.R.

As an extension of this work, the coefficients of epicentral density were further computed for some separate regions of U.S.S.R. They gave the following distribution: Pamir-Altai, 21-20; Tian Shan, 10; Caucasus, 4-8; Lake Baikal region, 6; and Kamchatka, 4. The computation of coefficients is described; it does not take into account the change in the area of the trapezoids with changing latitude. As a further extension of this work, histograms of epicentral density were plotted for central Asia and the Caucasus, where the data were available for subdivisions of 2°. These more precise determinations confirmed the observed correspondence between epicentral density and mountain distribution. - V. S.

7692. Roberts, John. Earthquakes Reveal Oil Fields. Petrol. Times, London, vol. 48, No. 1,221, 1944, pp. 315-317, 323.

The author inquires into the connection between earthquakes and oil fields and advances a hypothesis of oil formation by rock disturbance (see also Geophys. Abs. 114, No. 7090). Every faulted region has been subjected in the past to earthquakes, creating rock displacements and producing earth tremors. At the same time, fault formation generates frictional heat, which is a factor in producing oil. Supporting examples are cited in California, New Zealand, Japan, Turkey, and Iraq; in the Los Angeles area, oil pools lie either parallel with the mountains or along other displacement zones. These considerations are offered in expansion of the author's metamorphic distillation theory of oil formation. Some other facts are presented in support of

s theory, and refutations of criticisms are made. Conclusions are de-
ed as to the possible discovery of new oil fields. Promising [illegible]
pect are extensions of the Iraq fields from Mosul both northwestward into
a and Turkey, and southwestward to Beirut and Cyprus. - V. S.

3. Scholte, J. G. On Surface Waves in a Stratified Medium. Proc. Akad. Wetensch. Amsterdam, vol. 45, 1942, pp. 159-169, 349-356, 516-527.

When a plane wave moves in space toward a level boundary surface, three
ds of surface waves can be effected: (1) Love waves in the case of a
nsversal wave travelling perpendicular to the plane of strike; (2) genera-
ed Rayleigh waves in the case of a very thick or very thin upper stratum;
d (3) generalized Stoneley waves travelling along the boundary surface
d having an amplitude fading exponentially above and below the boundary
rface; the latter waves appear only when the thickness of the upper stratum
large in comparison with wave length. Theoretical calculations show that
ese types of waves can arise if the amplitude of the plane wave approaching
e boundary surface is simultaneously reduced to zero. The Rayleigh and
oneley waves appear only when the elastic constants of the strata are within
rtain definite limits. The Stoneley waves are studied by the author in
tail. - V. S.

94. Shnirman, G. L. An Electromagnetic Seismograph of High Sensitivity (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 49-53.

A new seismograph is offered for reflection surveying. It is made
ssible by the introduction of nickel-aluminum alloys with high magnetic
luctance. When such a magnet moves between two cores rigidly connected
e with another, the magnetic field is redistributed in the cores while
e changes little in the magnet. Mathematical equations are written for
duced currents and electromotive forces generated in the cores by the
splacements of the magnet. The seismograph has a small, rectangular mag-
t attached to two interconnected horizontal bars. These bars are fastened
y means of flat steel springs to the frame of the apparatus. Above and be-
w the bars are placed magnetic cores and coils rigidly attached to the
ame. By virtue of the springs the magnet can have small vertical oscil-
tions between the cores. The damping of oscillations is effected by means
f pistons. - V. S.

695. Sloat, John. How NOT to Find an Oil Field. Geophysics, Menasha, Wis., vol. 9, No. 4, 1944, 431-446.

This paper discusses causes and cases of seismograph misinterpretation,
ith examples of errors resulting from certain spreads, from weathering com-
utations, and from incorrect velocity assumptions. The question is raised
s to whether subterranean weathering corrections, echo reflections, trans-
erse waves or regional velocity gradients have caused serious misMapping of

structure. The evaluation of results from dip shooting is reviewed, with cases showing how oil fields have been missed. The psychological factor in picking records is stressed and the use of marked records in correlation is questioned. The need for a better criterion of correlation is expressed, and it is suggested that a more complete study of results might result in fewer dry holes. - Author's abs.

7696. Swan, B. G. Index of Wells Shot for Velocity.. Geophysics, Menasha, Wis., vol. 9, No. 4, 1944, pp. 540-559.

This index lists 811 wells in which seismic velocity surveys have been made. In so far as possible to obtain, information has been listed concerning the location, survey depth, by whom and when made, and the company or cooperative association responsible for the survey. It is intended that the index be brought up to date at approximately 6-month intervals in future issues of Geophysics. - Author's abs.

7697. Trappe, F. Die reflexionsseismische Untersuchung an der Flankenzone eines norddeutschen Salzstocks (A Seismic Reflection Survey of the Flank Zone of a North German Salt Dome). Oel u. Kohle, Berlin, vol. 38, 1942, p. 1429.

A salt dome in northern Germany was studied which had been previously explored by torsion balance and seismic refraction. A reflection survey was now undertaken of its flank zone to amplify the information. No continuous profiling was made, but close attention was paid to linking together reflections of the same character. The velocities used for calculations were smaller than those proved by refraction. On the basis of this work a flank hole was bored. An error of only 4 percent was made in reaching the upper Cretaceous layer, and a very good profile of strata was obtained. A later survey covered the deeper layers. It was made in 1941 by means of seismograph equipment with automatic equalization of amplitudes. This novelty made it possible to obtain more definite reflections for shallower depths. Deep boring substantiated the accuracy of findings. In all, seismic reflections gave information on the lower boundary of the Miocene, the middle range of the Upper Eocene, the Tertiary Cretaceous boundary, and a Turonian horizon near the upper boundary. - V. S.

7698. Willis, Bailey. Philippine Earthquakes and Structure. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 2, 1944, pp. 69-81.

The accompanying two maps show the distribution of earthquake epicenters in the Philippine archipelago as plotted by W. C. Repetti. The text presents their relations to active structures of several types observed by the writer in a geological reconnaissance in the spring of 1937. The dynamics of the archipelago and the mechanisms of the stresses are sketched in accordance with the hypothesis that the Philippine block is an erupted mass rising along the contact between the crustal elements that respectively underlie the China Sea and the adjacent Pacific Basin. - Author's abs.

7699. Zanon, F. S. Microsismi prodotti da urti (Microseisms Produced by Shocks). Geofis. Pura Appl., Messina, vol. 4, 1942, pp. 97-102.

The stranding of a 550-ton steamer in the Giudecca Channel, Venice, produced two strong shocks. The ensuing microseisms were recorded at the geophysical observatory. The vertical and horizontal components registered by Vincentini and Agamennone instruments are presented. The dependence of curves on the condition of the ground is discussed. The interval between the two shocks computed from the curves was 23 sec. - V. S.

4. ELECTRICAL METHODS

7700. Bulashevich, Yu.P. Concerning the Question of Studying Electrical Anomalies on Models (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Ser. Geog. Geophys., Moscow, No. 6, 1943, pp. 354-358.

In electrical prospecting, interpretation aims at determining the causes of anomalies. For such a purpose the experimental study of models in the laboratory offers greater possibilities than theoretical deduction. However, models often have dimensions of the order of meters and must be made hollow. Their conductivity is thereby affected. There arises, therefore, the problem of the equivalence of solid and hollow figures for the electrical conductivities customary in prospecting. The author compares the modifications produced in electrical fields (D.C.) by solid and hollow models. He calculates the effective conductivity of a solid and hollow sphere and cylinder in a heterogeneous and homogeneous electrical field. The mathematics are presented. They show that, under certain conditions, a hollow body behaves in any D.C. field in the same manner as a solid body. Some forms of the body are more conducive to equivalence of effects than other forms. - V. S.

7701. Calfas, P. La prospection électrique du sous-sol. La recherche et l'étude des champs pétrolifères et des gisements houillers (Electrical Prospecting of the Subsoil. The Search and Study of Petroliferous Fields and Oil Deposits). Génie civil, Paris, vol. 119, 1942, pp. 217-220.

A description is given of the customary methods of electrical prospecting. Detailed consideration is devoted to the Schlumberger equipotential method and to the electrical logging of boreholes. - V. S.

7702. Ebert, A. Grundlagen zur Auswertung geoelektrischer Tiefenmessungen (Foundations of the Evaluation of Geoelectrical Measurements in Depth). Beitr. angew. Geophys., Leipzig, vol. 10, 1942, pp. 1-17.

The author discusses the interpretation of measurements of electrical resistivity. Basic principles are advanced for the cases of two and three ground layers. The problem of three layers is treated by reference to two layers. Consideration is given to the possibilities of interpretation in the case of four layers. - V. S.

7703. Fitzgerald, P. E. Some Recent Advances in Well Treating Methods and Equipment (World Petrol. Abs.). World Petrol., New York, vol. 15, No. 10, 1944, p. 98.

The Dowell electric pilot is an electrically operated device indicating the position of the interface between conductive and nonconductive fluids. Originally it served for controlling the selective acidizing of oil wells. At present its application has been extended to well surveying. One valuable use is the accurate location and evaluation of permeable zones in a well. In making such well profiles the usual procedure is to introduce enough salt water to cover the section to be surveyed and then to force this fluid into the formation at a constant rate by following with oil. Obviously, the rate of the fall of the salt water-oil interface is more rapid when the salt water stands opposite a permeable zone. The data obtained are quantitative. When plotted, they show the position and relative importance of the various permeable zones. Some other uses of the electric pilot are indicated. - V. S.

7704. Grosskopf, J., and Vogt, K. Ausbreitungsmessungen über inhomogenem Boden (Measurements of Propagation Over an Inhomogeneous Ground). Hochfrequenztechn., Leipzig, vol. 60, 1942, pp. 97-99.

Measurements were made of the radiation of a vertical dipole sender over an inhomogeneous ground. Two antennae were used. The magnitude and phase of the field's intensity, the dielectric constant, and the conductivity of the ground were determined. The stations were distributed over a circle with a radius of 50 meters. It was also possible to calculate the ground constants related to the dielectric constant and to the conductivity; the methods are described. The effective ground constants further served for computing the field strength and the phase curve. These calculated values were then compared with the empirical values obtained by the measurements. An example of the comparison is presented, showing a good agreement between empirical and computed results; a marked inhomogeneity of the ground is indicated in a given azimuthal direction. - V. S.

7705. Guyod, Hubert. Electrical Well Logging. Parts 4-15. Oil Weekly, Houston, Tex., vols. 114-115, 1944.

This series aims at dealing with electrical well logging in its entirety. It covers the various problems and techinques with regard to both their theoretical basis and practical application. Each subject is treated in detail, many particular cases are discussed, numerous drawings, tabulations, and summaries are given, and bibliographies are added. The contents are organized into the following subdivisions (for parts 1-3 see Geophys. Abs. 118, Nos. 7560-62):

Part 4: Multiple-electrode logging methods, vol. 114, No. 13, pp. 34-44.
Part 5: The logging of parallel beds, vol. 115, No. 1, pp. 42-64.
Parts 6-7: The three-electrode method, vol. 115, Nos. 2-3, pp. 26-40, 36-52.

Part 8: The four-electrode method, vol. 115, No. 5, pp. 48-57.
Parts 9-10: The two-electrode method, vol. 115, Nos. 6-7, pp. 44-58, 36-54.
Part 11: Fundamental properties of resistance curves, vol. 115, No. 8, pp. 48-50.
Part 12: Fundamental data for the interpretation of electric logs, vol. 115, No. 9, pp. 38-46.
Part 13: Electrical properties of oil-bearing reservoirs, vol. 115, No. 11, pp. 40-52.
Parts 14-15: Electrical potentials in boreholes, vol. 115, Nos. 12-13, pp. 44-56, 40-56.
Part 16: Conclusion of series: Applications of electrical logs, vol. 116, No. 1, pp. 50-52.
rief abstracts accompany most parts. - V. S.

706. Landes, K. K., and Wilson, J. T. Ground-Water Exploration by Earth-Resistivity Methods. Papers of Michigan Acad. Science, Arts and Letters, 1943, Ann Arbor, vol. 29, 1944, pp. 345-355.

The ground waters of Michigan were surveyed geophysically. Since most upplies are here obtained from fluvioglacial sediments in glacial drift heets, earth-resistivity methods were considered best-suited for explora-ion. The Plymouth district was chosen as a test area; eight stations were ccupied within Plymouth city limits and three stations in the Canton town-hip. The apparatus and procedure are described, and the data and interpre-ation discussed. The conclusion is reached that electrical resistivity ethods should be used in the search for ground water both in the glacial rift of Michigan and elsewhere. The drill is still necessary, but the umber of holes drilled can be cut to half. The average total cost of a esistivity survey is less than the cost of one drilled well. - V. S.

707. Moore, R. W. An Empirical Method of Interpretation of Earth-Resistivity Measurements. Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1743, 1944, 18 pp.

A graphical method of analyzing the data obtained from shallow earth-esistivity depth tests is presented. The method is based upon empirical esults and has no theoretical basis. The usual apparent resistivity-elec-rode spacing curve is used together with a cumulative resistivity-electrode pacing curve plotted on the same sheet. The greatly reduced scale required or plotting the cumulative values of resistivity together with the effect f the summation of the individual resistivity values serves to minimize the ffect of purely local surface anomalies and inadvertent errors of measure-ent. The point of intersection of tangents or straight lines drawn to ntersect at zones of maximum curvature in the cumulative curve indicates he depth to the underlying material. Numerous figures are presented in hich data from published reports and from recent field studies are analyzed nd the results compared with actual depths established by borings or with epth values obtained by the use of theoretical methods of analysis.

Smoothly rounded curves of apparent resistivity such as are often obtained in the field, and which have been a serious drawback to attempts to analyze the data empirically heretofore, appear to be susceptible to rather accurate analysis by the method described. The method is best suited to analyses involving shallow two-layer formations. It has been applied successfully, however, in analyzing the data obtained from tests made over shallow three-layer formations. As with most empirical methods, its chief advantage is its simplicity and ease of application. - Author's abs.

7708. Müller, Max. Die Abnahme der Stromdichte einer elektrischen Doppelquelle mit wachsender Entfernung (The Decrease of the Current Density of an Electric Doublet with an Increase of Distance). Ztschr. Geophys., Braunschweig, vol. 18, 1943, pp. 67-75.

Theoretically the current density of an electric doublet decreases with distance. More specifically, it decreases for spatial conductors with the cube of distance; for plane conductors, with the square of distance; and with linear conductors, directly with distance. There follows from this relationship the conclusion that the electrical localization of disturbing bodies is possible at greater distances with the use of linear and plane conductors, than with the use of spatial conductors. Moreover, in the case of a use of alternating current, the effective distance depends also on frequency. - V. S.

7709. Pluvinage, Philippe. Influence de la convection thermique sur le champ électrique terrestre (The Influence of Thermal Convection Upon the Terrestrial Electrical Field). Compt. rend., Acad. Sci., Paris, vol. 216, No. 9, 1943, pp. 303-304.

Observations of the terrestrial electrical field are often made in the absence of steady winds. Continuous and uniform sweeping of atmospheric ions is thus lacking. The author observed in 1943 the effects of such an atmospheric change on the measurement of electrical anomalies. At the summit station of the Puy de Dôme, France, a local thermal convection produced in summer an ascending vertical air current substituted for the ordinary regular wind. This current lasted several hours at a time and reached a height of 740 m.; inside its column the air was very agitated. On these occasions the terrestrial electrical field registered very pronounced disturbances. The potential was measured by the procedure of C. W. Lutz (Gerlands Beit. Geophys., vol. 31, 1937, p. 398). The results showed that the values recorded were about doubled, namely: 280 instead of 150 V/m at 8 a.m., and 450 instead of 220 V/m at 5 p.m. The records indicated considerable fluctuation, contrasting with the stability of ordinary measurements in the Puy de Dôme. - V. S.

7710. Rose, N. A., White, W. N., and Livingston, Penn. Exploratory Water-Well Drilling in the Houston District, Texas. Geol. Survey Water-Supply Paper 889-D, Washington, D. C., 1944, 315 pp. Price, 15 cents.

In 1939 a program of exploratory drilling was undertaken in the Houston istrict, Tex., in connection with a general investigation of the water re- ources of the district. Thirteen test wells, 5-1/2 inches in diameter and anging in depth from 360 to 2,000 feet, were put down with a hydraulic otary drill. All were electrically logged. On the whole, the results tend o show that, although electrical logs give much information that is useful n the development of water wells, for the present at least these logs should e used in conjunction with driller's logs and drill-stem sampling of both and and water in all the more promising sand horizons. - Authors' abs., ondensed by V. S.

711. Short, E. H., Jr. Electrical Prospecting Method Used in Gulf Coast Search for New Reserves. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 10, 1944, pp. 70-77.

A new electrical-resistivity method of prospecting is reported. It in- olves the use of the Elflex apparatus designed on the idea of K. Evjen. This pparatus measures a potential produced by a unit current of definite fre- uency. The measurements indicate the average resistivity of a section of arth about 1,000 feet in thickness. The depth of this section can be con- rolled by maintaining the necessary frequency, because deeper formations nfluence lower frequencies. The observed readings themselves give the type f information desired, without the necessity of elaborate calculations. The ield equipment consists of an instrument truck and a cable truck. Stations re usually set 1,500 feet apart; electrodes are arranged according to a efinite scheme. The use of measurements is illustrated in the paper by xamples of contour maps. The method should be of assistance in finding il beds, particularly in cases of stratigraphic traps with no detectable tructure. It is now used along the Gulf coast. (A review appears in Min. our., London, vol. 223, No. 5695, 1944, p. 627.) - V. S.

712. West, T. S., and Beacham, C. C. Precise Measurement of Deep Electrical Anomalies. Geophysics, Menasha, Wis., vol. 9, No. 4, 1944, pp. 494-539.

A method of electrical prospecting has been developed in which the dele- erious effects of superficial inhomogeneities in resistivity are eliminated. n electrode configuration is used consisting of a current electrode at infinity", a pair of current electrodes with a constant separation of a ew hundred feet which are used alternately, and a pair of potential elec- rodes with a constant separation of a few hundred feet, collinear with the air of current electrodes, and at a distance from them which is varied to ecure depth resolution. It is demonstrated that superficial influences are liminated by forming the resistivity increment, the ratio between apparent esistivity determined by use of the closer current electrode of the alter- ate pair and that determined by use of the farther current electrode of the lternate pair. It is also demonstrated that the area explored is below a oint approximately half-way between the alternate pair of current electrodes.

Resistivity increment curves, called RESISTOLOGS by the authors, can be orrelated from station to station, and after they are correlated the lateral

variation in the electrical properties of selected subsurface zones can be studied. As a result of the latter characteristic of the measurements, a possibility exists for the direct location of oil and gas, observational evidence for which is presented.

The results of surveys made in Hart County, Ky., and in the Sam Fordyce Seven Sisters, Pettus, Branyon, Dunlap, Oakville, and Rhode Ranch fields of southwest Texas are displayed. - Authors' abs.

5. RADIOACTIVE METHODS

7713. Beers, R. F., and Goodman, Clark. Distribution of Radioactivity in Ancient Sediments. Bull. Geol. Soc. America, Baltimore, Md., vol. 55, No. 10, 1944, pp. 1229-1254.

By the use of beta-ray counters a method has been developed for the determination of the three radioactive constituents in ancient sediments - potassium, thorium, and uranium. Owing to the high efficiency of the counters to beta radiation only 5 grams of sample are required. The apparatus is calibrated with radioactive standards. Over 300 samples representing several distinct types of sedimentary rocks have been measured. The highest concentration of all three radioactive constituents was found in the Antrim formation, an organic black shale of Mississippian-Devonian age in Michigan. Similar characteristics were observed in the Chattanooga formation from wells in Oklahoma. These black shales show maxima of organic matter, uranium, thorium, potassium, colloidal size grades, and thorium:uranium ratio. The radioactivity measurements are complicated by the high emanating power of these shales. Logs of beta-ray activity, alpha-ray activity, and estimated percent black shale have been made on cuttings from Pure No. 3 Gingrich, Osceola County, Mich., between depths of 1,600 and 3,200 feet. These logs included the Marshall and Ellsworth formations, the Antrim shale, and the Traverse limestone. The results indicate significant variations in the distribution of radioactive elements and organic materials in these sedimentary rocks. It is concluded that the principal loci of radioactivity are (1) in heavy minerals in sands and sandstones, (2) in potassium-bearing sediments, and (3) in sediments of colloidal deposition. These relationships are of possible importance in defining the source beds of petroleum. - Author's abs.

7714. Belluigi, Arnaldo. Determinazione della potenza della coperture e profondita di alimentatori geologici metaniferi con misure gasometriche (The Determination of the Depth and Stratum-Thickness of Geological Accumulations of Methane by Means of Gasometric Measurements). Metano, vol. 4, No. 11, 1942, p. 13.

A mathematical hypothesis is presented for the exploration of subterranean gas accumulations. It is based upon Königsberger's theory of emanation from radioactive centers covered by alluvial strata. A new apparatus is also offered for micrographic measurements. It can serve for the measurement of gas accumulations discovered by drilling and otherwise. Its data are comparable with similar data secured by other methods. - V. S.

7715. Goodman, Clark, and Evans, H. D. Determination of the Helium Content of Terrestrial Materials. Rev. Sci. Instruments, Lancaster, Pa., vol. 15, No. 5, 1944, pp. 123-128.

With only minor modifications, the direct-fusion technique, as previously developed for emanation measurements, can also be employed to liberate helium from terrestrial materials. The rock gases are purified, and the helium is measured quantitatively with a sensitive McLeod gauge. In geological age studies of igneous rocks and "nonradioactive" minerals, the helium contents ranged from 0.25 x 10^{-5} to 65 x 10^{-5} with modal and median values of 1.8 x 10^{-5} cc. He (at 0° C. and 76 cm. Hg) per gram. - Author's abs.

7716. Keevil, N. B., Larsen, E. S., and Wark, F. J. The Distribution of Helium and Radioactivity in Rocks: The Ayer Granite-Magmatite at Chelmsford, Mass. Am. Jour. Sci., New Haven, Conn., vol. 242, No. 7, 1944, pp. 349-357.

Of 12 minerals studied in concentrates from the Chelmsford granite-magmatite, zircon, apatite, epidote, and biotite have more than 5 times the radioactivity of the parent rock; accessory minerals account for half the total radioactivity. A 150,000-fold contrast in helium content was found between zircon and feldspar, yet the zircon containing 1.2 cc./gm. appears to retain helium, while more than 90 percent has escaped from feldspar and quartz. Excess helium over that produced since Carboniferous time was found in sphene. - Authors' abs.

7717. Khlopin, V. G. Radioactive Methods for Determining the Geological Age of Some Geological Formations in the U.S.S.R. (in Russian). International Geological Congress, Report of 17th Session, Moscow-Leningrad, 1937, vol. 4, Moscow, 1940, pp. 485-494.

The Joint Committee for the Determination of Geological Age, State Radium Institute of U.S.S.R., has taken the view that the process of radioactive disintegration is the most precise criterion of geological time. This disintegration occurs with a constant velocity and produces changes in the surrounding medium which characterize age and can be measured. The measurements may be made by means of the lead, helium, and oxygen methods; the methods are outlined. Geological age has been determined for different minerals and rocks containing uranium and thorium. The calculations were based on special nomograms. The following results were obtained: (1) The lead, helium, and oxygen methods give in application to different minerals of the North Karelian pegmatite dikes the lowest age limit as 1.4 x 10^8 years; (2) the lead and helium methods give in application to minerals of the Khibine massive the age of 3.4 x 10^8 year; and (3) the lead and helium methods give in application to the various minerals of the pegmatites of the Khilka region the age of 1.8 x 10^8 years. - V. S.

7718. Maxwell, C. T. Radioactivity Logs Prove Advantageous in Oil-Base Mud. Tomorrow's Tools - Today, Lane-Wells Co., Los Angeles, Calif., vol. 10, No. 3, 1944, pp. 22-23.

It is difficult to obtain satisfactory electrical logs in oil-base mud. This difficulty can be overcome by using radioactivity logging which is not affected by oil-base mud or any of the drilling fluids normally employed in drilling operations. Moreover, the radioactivity logging is just as effective when run after casing is cemented through a zone for completion by selective gun perforation. - Author's abs.

7719. Sawdon, W. A. Application of Radioactivity Logging to Special Drilling Problems. Petrol. Eng., Dallas, Tex., vol. 15, No. 9, 1944, pp. 66-68.

Radioactivity logging is being applied to an ever widening range of tasks. Originally it was developed to locate cased-off production by tracing formations behind strings of pipe. Now it is also employed to clarify subsurface records, check depths and thicknesses, furnish material for correlation, and supply data for various down-hole operations. There are, furthermore, many special jobs. (1) In some problems the applicability of radioactivity logging has been broadened by combining it with neutron logging. (2) A radioactivity log can be used in wells with muds contaminated by salt because it is not affected by the condition of the fluid. (3) Permeable zones may be located by placing a radioactive material in the drilling fluid and forcing it into the formation under pressure. (4) Artesian flow can be plugged accurately by identifying water-producing strata by means of logging. (5) Squeeze jobs are helped by adding radioactive carnotite to the cement. Some other applications are listed. - V. S.

7720. Shepherd, G. F. Use of Gamma-Ray Logs in Measurement Problems. Oil Weekly, Houston, Tex., vol. 113, No. 10, 1944, pp. 40-54.

At present the oil industry has to develop relatively thin reservoirs at increasing depths. Such work depends on correct depth measurements. Unfortunately, different types of logs often give incomplete and conflicting measurements. In order to clarify the determinations, it is helpful to use gamma-ray logs. The problem is here reduced to determining: (a) The position of the object-sand on the log, and (b) the distance of this position down to the total depth of the log. This problem is discussed in connection with electrical logs, drilling time logs, gamma-ray logs, sources of error in correlation, statistical errors, multiple correlation, correction factors, etc. The following combined method is offered: (1) Tabulate all apparent correlative points between electrical and gamma-ray logs; (2) select a correction factor for each zone; (3) if more than one zone is found, determine where the change in correction factors occurs; (4) identify the position of the object sands on the gamma-ray log by applying the correction factor when the position cannot be established directly by correlation; and (5) calculate distance above the datum zero on the gamma-ray log to completion depths in the object sands. The paper is supplied with a bibliography. - V. S.

721. Simpson, J. A., Jr. Four-Pi Solid Angle G-M Counters. Rev. Sci. Instruments, Lancaster, Pa., vol. 15, No. 5, 1944, pp. 119-122.

Two types of Geiger-Müller counters which count the particles in a solid ngle slightly less than 4π are described. The use of thin metal windows ermits their use with low-energy β-particles. They are useful for small oint sources or in determining the radioactivity of thin foils. Details of ne construction are presented. A differential vacuum system for filling hin-window 4π counters is described. - Author's abs.

722. Sterrett, Elton. Radon Emanations Outline Formations. Oil Weekly, Houston, Tex., vol. 115, No. 4, 1944, pp. 29-32.

Recent work with radon emanations shows that they can be applied to ubsurface exploration for oil. The equipment used differs little from that irst adapted to collect the emanations. The improvements consist in a etter understanding and interpretation of findings. They point to different ypes of geological conditions where the radon emanations can be serviceable, ither alone or in conjunction with other methods. The following problems re considered by the author: (1) Defining shoestring pools, (2) determining il-water contact; (3) checking "pimple" pools; and (4) finding closure gainst a fault. The discussion is illustrated by examples of survey maps. - . S.

6. GEOTHERMAL METHODS

723. Kraskovsky, S. A. Geothermal Measurements in Ore Deposits (in Russian). Akademiia Nauk S.S.S.R., Trudy Komissii po Geotermike, Moscow, Vypusk I, 1941, pp. 10-11.

The author reviews geothermal measurements in regions of Russian ore eposits from the beginning of such work; he does not claim complete infor- ation. In 1828 Cupffer surveyed three copper mines in the Urals. The emperature measured at depths of 30 to 112 meters in the water ranged from ° to 6° C.; the geothermal gradient computed by the method of least squares as 24.8 m./C°. In 1894 Zalessky surveyed the Il'inskii gold mine in eastern iberia at a depth of 160 meters and found the temperature of the rock to be .5° C. In 1913 Iachevskii made measurements in the Siberian iron mine Abakanskaia Blagodat"; the temperature in a borehole at a depth of 118.4 eters was 5.5° C. and the geothermal gradient 36.8 m./C°. He also surveyed n the same year the Nikitovka mercury mine in the Don Basin; the temperature t a depth of 72.4 meters was 14° C. and the geothermal gradient 11.6 m./C°. n 1933 Popov studied a borehole in the town of Krivoi Rog and found a emperature of 20.5° C. at a depth 1,125 meters and a geothermal gradient 12.5 m./C°. In 1938 Vladimirov, Kraskovsky, and Semenov made several sur- eys in the Artic, on the Kola Peninsula. They found, for depths of 300 to 50 meters, temperatures from 4.25° to 5.45° C. and gradients from 136.1 to 70.7 m./C°. The paper gives some details and conclusions of the described ork. - V. S.

7724. Mühlberg, Max. Temperaturmessungen in der Bohrung Tuggen in der Linthebene und einige andere Befunde in der Schweiz (Temperature Measurements in the Borehole near Tuggen in the Linth Plain, and Other Findings in Switzerland). Eclogae Geologicae Helvetiae, Zürich, vol. 36, No. 1, 1943, pp. 17-34.

In 1925-28 the Geological Commission of the Swiss Society for Nature Study made thermal measurements in the borehole near Tuggen, in the Linth Plain. The survey was carried out by means of air-bubble thermometers and mandrel thermometers. They were packed into steel containers, lowered into the borehole, and kept there 55.5 hours. Six stations were covered at different depths down to 1,300 meters, with varying reliability. The procedure, instruments, preparatory tests, different corrections, and the geological profile of the borehole are described. The observed temperatures ranged for different depths from 31.65° to 54.45° C. The geothermal gradients were: (1) From 0 meter down to 1,299.23 meters, 3.46° C./100 m.; and (2) from 647.33 down to 1,299.23 meters, 3.44° C./100 m. J. Königsberger has computed corrections for the effects of glaciers; the values are given. Eight other thermal surveys in Switzerland are briefly outlined. - V. S.

7. GEOCHEMICAL METHODS

Belluigi, Arnaldo. Determinazione della potenza delle coperture e profondita di alimentatori geologici metaniferi con misure gasometriche (The Determination of the Depth and Stratum-Thickness of Geological Accumulations of Methane by Means of Gasometric Measurements). Metano, vol. 4, No. 11, 1942, p. 13. (See No. 7714 in this issue.)

7725. Merritt, J. W. Geochemistry as Aid to Successful Exploration. Oil Weekly, Houston, Tex., vol. 115, No. 6, 1944, pp. 35-38.

Geochemical surveys of oil deposits analyze surface samples for various hydrocarbons. The sampling points are disposed in the field preferably in grid fashion; the spacing should not generally exceed 660 feet. The hydrocarbons used can be classed in three groups - solids, liquids, and gases; the latter two groups are more commonly employed. The analysis of samples can be volumetric, gravimetric, spectroscopic, photometric, etc. The results serve for mapping isochem contours. The contours have been found to form different hydrocarbon density patterns. In early surveys the halo pattern was developed; quite unexpectedly, the greatest concentration of hydrocarbons on the surface forms here a marginal band or halo about the underground productive area. In later surveys geochemists developed another pattern in which concentration increases from the periphery to the center of the productive area. Illuminating studies in three dimensions were made of density patterns in and about producing oil wells. Interpretation of density patterns is difficult because the various productive horizons superposed upon one another under the ground all project their patterns to the surface. - V. S.

7726. Tripp, R. M. Analytical and Experimental Data Concerning a Solid Hydrocarbon Survey of the Fort Collins Anticline. Geophysics, Menasha, Wis., vol. 9, No. 3, 1944, pp. 367-387.

An analysis is made of the properties of sediments and their derived products which pertain to the migration of gaseous hydrocarbons. From a thermodynamic consideration the zone of secondary mineralization is localized and the appearance of radioactive highs over structure is possibly explained. A distinction is made between the types of soil waxes, and an hypothesis is advanced to explain the origin of the petroleum derived waxes. The results of a soil wax survey of a producing structure are presented and discussed. No implication is intended regarding the general usefulness of the technique. - Author's abs.

7727. Zobell, C. E. The Influence of Bacterial Activity on Petroleum Deposits and Products (abs.). Tulsa Geol. Soc. Digest, Tulsa, Okla., vol. 12, 1943-44, p. 38.

The author suggests that bacteria and allied micro-organisms play an important role in the production and accumulation of oil. The various considerations supporting such view are indicated. The conclusion is drawn that the tendency of bacteria to oxidize volatile hydrocarbons in surface soil may provide an inexpensive and practical procedure for prospecting before more thorough geological investigation. - V. S.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

7728. Adams, J. E. Paleogeography and Petroleum Exploration. Jour. Sedimentary Petrol., Tulsa, Okla., vol. 13, No. 3, 1943, pp. 108-111.

Paleogeography in a broad way controls the deposition and distribution of source beds and reservoirs. The search for new deposits of petroleum is aided by the use of special paleogeographic maps. The term sulithogeography is introduced to cover distribution of favorable lithologic areas. Other types of maps that may be used show salinity, thickness of sands, paleogeology and paleotopography. All these maps can be combined with structural contour maps to show depositional and post-depositional dips. - Author's abs.

7729. Barnes, K. B. Core Analysis: Methods and Applications - A Summary. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 24, 1944, pp. 98-101.

Presents summary of the tests, procedures, and applications of core analysis. It deals with porosity, saturation, permeability, oil recovery, core sampling, construction of graphs, and interpretation. A bibliography is appended. - V. S.

7730. Bartels, Julius. Statistik in der Geophyzik (Statistics in Geophysics). Ann. Hydrogr., Berlin, vol. 71, 1943, pp. 107-114.

The author discusses the applications of statistics to geophysics, meteorology, oceanography, etc. He deals mostly with graphic and numerical methods, periodicity, and spherical functions. Particular attention is devoted to geophysics. Statistical methods are here often applied to problems for which they are not suited. Such a use is deceptive. The various statistical techniques developed for different subject matters are specifically adapted in each case to satisfy intrinsic requirements. Only a few of these techniques have been directly adjusted to geophysical problems. The greatest difficulty lies in the variability of geophysical materials. The author gives numerous typical examples for showing correct and erroneous application. Some literature on statistical periodicity is reviewed. - V. S.

7731. Borisov, A. A. The findings of the West-Siberian Expedition of the State Siberian Geological Trust (in Russian). Razvedka Nedr, Moscow, vol. 11, No. 6, 1941, p. 30.

A geophysical expedition was sent to western Siberia in 1939 under the sponsorship of the Government. Its purpose was primarily to outline the Paleozoic relief and to search for oil. The work consisted of gravimetric, seismic, magnetic, and electrical measurements. It covered mainly a zone about 100 km. wide between Cheliabinsk and Petropavlovsk. Farther north, there was also gravimetric and magnetic exploration in the Ob and Irtysh River Basins. In the Tavda district electrical surveys were made. The findings of the expedition are embodied in a large hypsometric map of the Paleozoic subsurface. On this map are indicated the localities offering a promise of oil. - V. S.

7732. Bowie, W. Surfaces of the Earth. Jour. Geol., Chicago, vol. 40, No. 8, 1932, pp. 739-744.

A general notion is given of the various surfaces of the earth, such as: The surface of the ground, the surface of the sea, and the mathematical surface of the earth as produced by an ellipsoid of rotation. Some details of the latter, of interest to geophysicists, are presented. The most accurate dimensions for the ellipsoid forming the surface of the earth were derived from geodetic data of the U. S. Coast and Geodetic Survey. - W. A.

7733. Bucher, W. H. The Stereographic Projection, a Handy Tool for the Practical Geologist. Jour. Geol., Chicago, vol. 52, No. 3, 1944, pp. 191-212.

Structural geology involves space relations. Therefore, its problems lend themselves particularly well to solution by the methods of stereographic projection. A number of problems are enumerated, such as finding

the apparent dip in a vertical plane cutting an inclined bed, the position in space of the line of intersection of two inclined planes, etc. To understand the nature of stereographic projection it is necessary to visualize the lower half of a sphere with the equatorial plane in horizontal position. Then a stereographic projection is produced by drawing straight lines from the upper pole through the points on the lower hemisphere and extending them to their intersections with a horizontal plane at any desired distance below the hemisphere. In the resulting projection, every point on the plane represents a corresponding point on the hemisphere. Drawings illustrate the procedure. The method requires the use of a "stereonet" made by a projection of meridians and parallels. The geologist places a piece of transparent paper over this net and prepares on it his "stereogram". Step-by-step solutions of numerous problems are offered to illustrate the method; some of them involve rotation. In an appendix, D. J. Fisher has added suggestions for several simplified solutions. - V. S.

7734. Dobrin, M. B. Description of ESMWT Course in Petroleum Geophysics Conducted in Washington, D. C. Geophysics, Menasha, Wis., vol. 9, No. 4, 1944, pp. 560-562.

A course in petroleum geophysics was given by the author at George Washington University, Washington, D. C., during the spring and summer of 1944. It was a part of the Engineering, Science, and Management War Training Program sponsored by the U. S. Office of Education. The Government finances all such instruction. The subject matter of the course covered fundamentals of petroleum geology and of the gravitational, magnetic, seismic, electrical and geochemical methods of exploration. - V. S.

7735. Johnson, J. H. Paleontology, Petroleum, and the Search for Oil. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 28, No. 7, 1944, pp. 902-908.

All of us, geologists, geophysicists, or paleontologists, are endeavoring to help win the war by finding new supplies of petroleum. Our task is difficult because in the United States all the easily discovered simple structural accumulations have been found. This paper briefly reviews the field of paleontology as utilized by the oil industry, and the relation of paleontology to petroleum geology and geophysics. The type of geological problems facing industry in its search for new oil is discussed. To solve these problems much research is needed and a through coordination of all personnel, geological, geophysical, and paleontological, into a smooth-working team. The problems of the future are too large and too complicated to be solved by individuals or single methods of attack. - Author's abs.

7736. Jung, Heinrich. Beispiele für die Anwendung von Anaglyphen-Raumbildern in der Geophysik (Examples for the Use of Anaglyphic Space Diagrams in Geophysics). Ztschr. Geophys., Braunschweig, vol. 17, 1942, pp. 291-308.

Some geophysical problems are difficult to visualize in space. The author chooses several examples of them to illustrate the use of helpful three-dimensional diagrams. General methods of construction of such spacial representations are described, and directions are given for interpreting them. - V. S.

7737. Kellum, L. B. Geologic History of Northern Mexico and Its Bearing on Petroleum Exploration. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 28, No. 3, 1944, pp. 301-325.

Buried platforms comparable with the Coahuila Peninsula of north-central Mexico are known to be present in several of the major down-warped areas in the central and coastal United States and beneath the coastal plain of eastern Mexico. It is believed that others may be present. The purpose of this paper is to point out certain criteria which may aid in their discovery. A series of paleogeographic maps has been compiled to show the geologic development of Mexico during late Paleozoic and Mesozoic time. The stratigraphic section on the buried Coahuila Peninsula is in marked contrast to the deposits in the geosyncline on the south. This is due to the influence of the underlying massif on sedimentation throughout a long period of geologic time. It indicates that facies of deposition may be used as a guide in locating buried positive elements in the subsurface. The influence of a buried massif on the structure of overlying strata is clearly demonstrated by the contrast between the relatively simple warping of Lower Cretaceous rocks over the Coahuila Peninsula and the tight, asymmetrical folding and overthrusting in the areas of the surrounding geosyncline. The physiography of the mountain ranges is an expression of the lithologic succession and geologic structure comprising them. Regionally it reveals the same contrast in underlying geology that marks the Coahuila Peninsula and the geosyncline. The area where great buried platforms, comparable with the Coahuila Peninsula, are likely to produce oil and gas in the future are the structurally down-warped provinces of the central United States and along the margins of the continent. - Author's abs.

7738. Kornfeld, J. A. Oil Search in the Eastern Gulf Region. World Petrol., New York, vol. 15, No. 6, 1944, pp. 27-34; also Mines Mag., Denver, Colo., vol. 34, No. 9, 1944, pp. 476-484.

The discovery of oil in the Everglades of southern Florida in November 1943 has prompted wide exploration in the eastern Gulf region. The gravity meter is chiefly used; the reflection seismograph and the magnetometer are also applied. The anomalies discovered are verified by core drilling. Vast areas in this region have never been explored geophysically and offer new possibilities. The author describes developments in numerous localities of Alabama, Florida, Georgia, and Mississippi. The data cover geophysical surveying, wildcat activity, average drilling depth, production data, completion work, etc. during the last several years. Southern Mississippi is given particular attention. Tables and maps illustrate the text. - V. S.

739. Leibenson, L. S. Application of Variation Equation of Elasticity to the Solution of a Geomechanical Problem of the Earth's Deformation and Vibration (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestia), Ser. geograph. et geophys., Moscow, No. 5, 1942, pp. 196-204.

The paper investigates the main geomechanical problem of the earth's eformation by means of forces possessing a harmonic potential. The earth s assumed to be composed of noncontracting, gravitating substance; the riginal distribution of tensions is taken to be hydrostatic. The author dopts a new method of solution based on the variation equation of the theory f elasticity. This method permits a simple estimation of the effects of ariable density and variable elasticity. At the end of the paper the new ethod is applied to the question of vibrations of the earth; an estimation f the effect of gravitation on the period is also given. - Author's abs.

740. Oil. Salt Domes of the Gulf Coast Region. New Orleans, La., vol. 4, No. 4, 1944, pp. 29-30.

In May 1944 M. A. Hanna addressed the New Orleans Geological Society n the characteristics, growth, and modifications of salt domes in the Gulf oast region. The region is covered with domes from the Rio Grande to the labama-Mississippi border. The typical dome cross section is a sequence f rock salt, anhydrite, gypsum, sometimes sulfur, and limestone caprock. he domes range in diameter from 1/2 to 8 miles, with a probable average idth of about 3 miles. The vertical extent of domes is calculated to be, n the average, 28,000 feet on the Gulf coast and 42,000 feet in south ouisiana. Domes are derived from a deep-buried sedimentary salt layer, robably of Paleozoic age. The force causing the domes to rise from the riginal layer is not known. Once the salt has started to push upward, urther growth can be caused by differential compaction. A dome continues o grow until the supply of salt is cut off or until an isostatic balance s reached. - V. S.

741. Oil and Gas Journal. Oil Discovery in United States Stalled by Its Own Success. Tulsa, Okla., vol. 43, No. 15, 1944, p. 67.

W. E. Pratt considers that the most promising parts of the earth in which to search for petroleum are the Near and Middle East in the Old World; the environs of the Gulf of Mexico and the Caribbean Sea in the Western Hemisphere; the Netherlands and British East Indies in the Far East; and the land fringing the Artic Sea in North America, Europe, and Asia. Only the Russians have made much effort to explore the petroleum possibilities of the Artic. - V. S.

742. Petroleo Interamericano. Glosario de los términos más comunmente usados en geología y geofísica. Ingles - Español; Español - Ingles. (Glossary of Terms More Commonly Used in Geology and Geophysics English - Spanish; Spanish - English). Tulsa, Okla., vol. 1, No. 5, 1944, pp. 113-136.

With the growth of the oil industry in Latin America there arises an urgent need for a standardized Spanish-English oil nomenclature. To meet this need, Petroleo Interamericano has undertaken to publish from time to time in its issues brief preliminary glossaries on different phases of the oil industry. These glossaries must be critically examined by oil men throughout South America, if a uniform Spanish terminology be established in all Latin-American republics. Petroleo Interamericano will welcome criticisms and suggestions. The present glossary on exploration has been prepared with the collaboration of the Colombian Petroleum Institute. - V. S.

7743. Ritzmann, O. F. Patents Vested in the Alien Property Custodian. Geophysics, Menasha, Wis., vol. 9, No. 3, 1944, pp. 388-401.

Some United States patents and the patent applications belonging to nationals of enemy and enemy-occupied countries have been vested by the United States Government in the Alien Property Custodian. A complete catalog, as well as separate lists in each class of the Patent Office classification, have been printed. These publications may be obtained from the office of the Alien Property Custodian, Chicago 3, Ill. The catalog contains over 25,000 entries and costs $7.00; the lists are available at nominal charge. In the present article the writer has listed from the catalog the patents that may interest geophysicists. He presents two groups: (1) List of United States patents pertaining to geophysics and vested in the Alien Property Custodian; and (2) United States patent-applications vested in Alien Property Custodian. Since the patent applications have not been previously available, the author includes brief abstracts of them. - V. S.

7744. Sawdon, W. A. Geophysics - Vanguard of South America's Future Oil Production. Petrol. Eng., Dallas, Tex., vol. 16, No. 1, 1944, p 120.

Extensive geophysical exploration is under way in South American countries, in preparation for post-war drilling; apparently, geophysical activities have never been so great as they are now. Most surveys are seismographic; the gravimeter and magnetometer are also employed. Information on the localities surveyed is not always reliable. The greatest amount of work is seemingly done in Colombia, particularly in the northern part, the llanos region, and near the mountains southeast of Bogota. In Venezuela the areas explored lie in the eastern part, west and south of the Orinoco Basin, and as far westward as the Barinas area. In Brazil exploration is made in the Parana area, south and west of the Amazon Delta, along the northeastern coast, and in the extreme west. In Argentina the Government carries on continuous geophysical work through the Y.P.F. Some surveying is also done in Chile. - V.S.

7745. Terrestrial Magnetism and Atmospheric Electricity. Note: Sever Institute of Geophysical Technology. T.M.A.E., Baltimore, Md., vol. 49, No. 2, 1944, p. 136.

A new geophysical school has been founded at St. Louis University on he award of H. E. Sever. It is called the Sever Institute of Geophysical echnology. The cirriculum will be devoted exclusively to geophysics, with view to replacing war-depleted reserves. The proposed courses cover cientific exploration for oil and minerals, meteorology, applied electronics, nd radio-communication engineering. - V. S.

7746. van Tuyl, F. M. Progress in Petroleum Exploration. Petroleo Interamericano, Printed in Spanish and English, Tulsa, Okla., vol. 1, No. 6, 1944, pp. 76-80; also Mines Mag., Denver, Colo., vol. 34, No. 9, 1944, pp. 459-461, 507.

The trends and problems created in petroleum exploration by the war are discussed. The role of the new Pan-American Institute of Mining Engineering and Geology at Santiago, Chile, is outlined. Several new and improved techniques are indicated, such as a new seismic refraction method, the trimetron method of aerial reconnaissance, a new electric pilot, the self-potential dipmeter, portable slim-hole drilling equipment, and a fluorograph for the detection of hydrocarbon in the soil. - V. S.

7747. Weller, J. M. Outline of Chinese Geology. Bull, Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 28, No. 10, 1944, pp. 1417-1429.

The geological characteristics of China proper, eastern and central Asia, and the coastal region are described. The structural framework of Greater China consists of three positive areas and the geosynclines that separate and enclose them; these are compared with analogous features of eastern North American. There are five large sedimentary basins - two in Chinese Turkestan, one in Tibet, and two in western and northern China proper. Most parts of China are intensely folded and faulted. - V. S.

9. NEW PUBLICATIONS

7748. Agapeyeff, Alexander de, and Hadfield, E. C. R. Maps. Meridian Books, London, Oxford University Press, 1942, 140 pp. Price, $1.75.

This book deals mainly with map making. It describes in popular language the principles, instruments, and techniques involved. (1) Distance: Scale, horizontal equivalent, accuracy required in surveying, calculation of area. (2) Direction: Magnetic variation, measuring direction, bearing and back bearing, types of compass, protractor, theodolite, types of traverse, errors of closure, intersection, resection, etc. (3) Height: Spot heights, contours, form lines, hill shading, the clinometer, leveling, aneroid barometer, etc. (4) Mapping large tracts of country: Triangulation and insertion of details, use of the plane table, etc. (5) Map projection: Latitude and longitude, effect of alteration of scale, orthomorphic shape projection, homolographic projections, distortion due to shearing, allowances for projection, geometrical projections, nongeometrical projections, etc.

(6) Characteristics of the commoner projections: Azimuthal or zenithal projections, cylindrical projections, conical projections, etc. Drawings and maps illustrate the text. - V. S.

7749. Bishopp, D. W. A Short Review of Irish Mineral Resources. Geol. Survey of Ireland. Emergency Period, Pamph. 1, Dublin, Stationery Office, 1943, 20 pp.

In discussing Irish mineral resources the author briefly mentions various geophysical methods and applications. Ireland has been geologically mapped on a scale of 6 inches to the mile, so that little probability exists of further discoveries from the surface. But large areas are covered by bog or glacial drift. This unseen territory is now explored by geophysical methods. The work is carried out under the direction of the Geological Survey in conjunction with the Emergency Research Bureau; it is the first such national undertaking in Ireland. The results so far obtained in County Wicklow are encouraging. - V. S.

7750. Daly, R. A. The Floor of the Ocean. Chapel Hill, N. C., University of North Carolina Press, 1942, 177 pp. Price, $2.50.

This volume brings to date the existing knowledge of the ocean floor. The determining methods and the results obtained are described. The contents cover the composition and thickness of the suboceanic crust and the nature of the underlying substratum; the islands, mountain structures, and oceanic deeps that diversify the relief of the deep-sea floor; and the submerged terraces and canyons of the continental slope. The contributions of the author are included. - V. S.

7751. Fedukovich, V. S. Physical Methods of Geophysical Prospecting (in Ukrainian). Tekhnichne Vidavnitstvo, Kharkov, 1932, 184 pp. Price, Rbl. 1.50.

A description is given of the methods of geophysical prospecting - magnetic, gravitational, seismic, electrical, radioactive, and geothermal. - W.A.

7752. Madelung, Erwin. Die mathematischen Hilfsmittel des Physikers (Mathematical Tools for the Physicist). New York, Dover Publications, reproducing Julius Springer's latest 1936 ed., 400 pp., 25 ill. Price, $3.50.

This reference book contains 4,000 advanced equations, formulas, and theorems of mathematics and mathematical physics. The text covers function theory, algebra, matrixes, series, group theory, differential and integral equations, transformation theory, vector analysis, calculus of variations, theory of probability, etc. The collection is supplemented by the fundamental concepts, definitions, and statements of the basic equations of the

eory of relativity, thermodynamics, and quantum theory. Advanced mathe-
tical methods for specific problems in applied and theoretical physics
e included. The formulas are expressed in internationally accepted
mbols. A German-English glossary is appended. - V. S.

53. Mathematical Tables Project, Work Projects Administration of the Federal Works Agency, U. S. A. Tables of the Bessel Functions $J_0(z)$ and $J_1(z)$ for Complex Arguments. Conducted under the Sponsorship of the National Bureau of Standards, A. N. Lowman, Technical Director. New York, Columbia University Press, 1943, 403 pp. Price, $5.00.

Bessel functions are encountered in certain problems of potential, heat
nduction, wave motion, etc. They have seldom been tabulated for complex
rguments. In the present volume, the functions $J_0(z)$ and $J_1(z)$ are tabulated
or argument points defined in polar coordinates. Along each of the rays
$= 0^\circ, 5^\circ, \ldots 90^\circ$, 10-place values of the real and imaginary parts of
$_0(z)$ and $J_1(z)$ are given for moduli ranging from 0 to 10 at intervals of
.01. A table of five-point Lagrangian interpolation coefficients is in-
luded. Introductory remarks deal with applications and properties of
essel functions, methods of computing $J_0(z)$ and $J_1(z)$, preparation of
anuscript, interpolation, etc. A bibliography is appended. (The various
ables prepared by the Mathematical Tables Project and made available through
he National Bureau of Standards are listed in the issues of the Journal of
esearch of this bureau, on the back cover). - V. S.

754. Meisser, Otto. Praktische Geophysik für Lehre, Forschung, und Praxis (Practical Geophysics for Study, Research, and Practice). T. Steinkopff, Dresden, 1943, 368 pp. Price, 37.50 RM.

This text book presents geophysical subject matter as required by the
erman curriculum for geophysics students, effective November 1941. The
ontents cover the gravimetric, magnetic, seismic, electrical, thermal, and
adioactive methods, their apparatus and techniques, and related subjects.
olid bodies in the earth are treated comprehensively, while water bodies
nd meteorology are handled in more cursory fashion. The emphasis is placed
n the experimental side; and many experimental results are cited. The
heoretical side is correspondingly reduced. - V. S.

755. Oliveira, A. I. de, and Leonardos, O. H. Geologia do Brazil (Geology of Brazil). Servico de Informacao Agricola, Rio de Janeiro, Sér. Didática 2, 2d ed., 1943, 813 pp. Price, $3.00

In this volume the authors have brought together all that is known of
he geology of Brazil. Chapter 1 reviews the history of geologic work. Suc-
eeding chapters are devoted to geological eras. In the case of each era
here are described paleogeography, climate, distinctive types of life, and
he geology of each important area of outcrop. The text is illustrated with
umerous plates and maps. - C. O. Dunbar, Am. Jour. Sci., vol. 242, No. 6,
944, p. 342; condensed by V. S.

10. PATENTS

7756. Method and Apparatus for Seismic Underground Prospecting; Raymond Maillet, Paris (16E), France. Vested in the Alien Property Custodian. U. S. Patent Application A.P.C. 254,743, published May 18, 1943.

Claims: "The object of the present invention is to take advantage of the property of the reflected waves of being relatively the richer in low frequencies as they come from the deepest mirrors. This result is obtained, according to the present invention, by varying the frequency curve of the amplifiers as a function of the time having elapsed since the time of emission, in such manner as to permit the passage of components which are the graver the more considerable the time thus elapsed. With this system, at the beginning of the experiment, the cutting-off frequency or the passing band can be chosen relatively high for insuring a good elimination of the superficial waves. This cutting-off frequency or this passing band is then automatically varied and generally lowered gradually along the frequency scale, so as to permit a good recording of the waves which have been refrected from the deep mirrors, the superficial waves having then disappeared or, at least, having but reduced amplitudes which permit this lowering. According to another feature of the invention I combine this characteristic with the automatic variation of sensitiveness as a function of time."

7757. Coring Tool; Marcel Schlumberger, Paris, France. Vested in the Alien Property Custodian. U. S. Patent Application A.P.C. 271,524, published May 25, 1943.

The invention relates to a new and improved coring tool which is adapted to be projected into a formation by means of a special form of gun lowered to the level of the formation, for extracting a core therefrom. The coring tool comprises a hollow member, preferably tubular in shape, having a closure member therein which is secured against forward motion within the hollow member, but which is capable of being moved rearwardly out of the hollow member by the application of force. The forces developed by the explosion of the charge in the gun are directed against the rear face of the closure member, imparting the requisite high velocity to the tool.

7758. Gun Perforator; Marcel Schlumberger, Paris, France. Vested in the Alien Property Custodian. U. S. Patent Application A.P.C. 315,157, published May 11, 1943.

The present invention relates to new and improved apparatus for perforating metallic casings. The apparatus comprises an assembly of similar units each of which is provided with a plurality of gun bores and cartridge chambers therein. Each unit includes igniting means for each gun therein adapted to be automatically interconnected. The apparatus is so designed that when the units are assembled, at least one continuous ignition path extends through the perforator. The powder in the successive cartridges is ignited by electric means. The guns lie in different horizontal planes and are angularly spaced about the longitudinal axis of the apparatus.

759. Thermometer for Deep Well Measurements; Oscar Martienssen, Kiel, Germany. Vested in the Alien Property Custodian. U. S. Patent Application A.P.C. 342,488, published May 4, 1943.

In deep wells which are filled with water or a heavy flushing liquid, eretofore temperature measurements have been carried out with maximum or ipp thermometers, if it was a matter of an individual measurement, or with lectric resistance thermometers, if continuous measurements along the length f the well were required. For the latter measurements the usual thermo- eters constructed with metal wires - iron, nickel, or platinum - were used, nc resistance of which was only increased by 1 percent for a rising tempera- urp of about 3° C. According to the present invention the thermometer con- ists of a semi-conductor having electronic conduction, such as a uranium ioxide or manganese-titanium-spinel resistor, such as is used as a series esistance in radio receiving sets under the name Urdox resistor. These esistors can be produced in rod or tube form of not much more than 1 mm. iameter and 10 mm. length, with a resistance as desired between 20,000 and 00,000 ohms at 10° C. The resistance of such rods increases by several ercent with an increase of temperature of 1° C. This high resistance, oupled with a high temperature coefficient, makes it possible to work with single conductor and an earth return, because their resistance and change n resistance is negligible. At the same time the dimensioning of the pro- ective housing can be made smaller and lighter, so that the thermometer lmost instantly assumes the temperature of its surroundings.

760. Gravity Meter; Anton Graf, Berlin-Steglitz, Germany. Vested in the Alien Property Custodian. U. S. Patent Application A.P.C. 377,395, published May 25, 1943.

One of the principal considerations in the construction of optic-electric gravity meters is that of eliminating any temperature influence from the heat producing sources of light upon the extremely temperature-sensitive parts of the instrument, that is, the photocells and the suspension spring. According to the present invention, protection against temperature influences is facili- tated by arranging the photocells back to back in the interior of the instru- ment so as to be capable of exposure to sources of light arranged outside of said instrument. A further point to be considered is that the photocells in the interior of the instrument, and particularly the diaphragms between these and the sources of light, are easily and accurately adjustable. For this purpose they are arranged in such manner that a perforated diaphragm is secured so as to be turnable and vertically displaceable in front of each photocell, a similarly perforated second diaphragm being suspended in front of said first diaphragms.

7761. Means for Measuring Magnetic Fields. Gustav Barth, Berlin, Germany; vested in the Alien Property Custodian. U. S. Patent Application A.P.C. 402,530, published May 18, 1943.

I.C. 7310

This invention relates to means for determining the magnitude of a magnetic field, in particular the field strength and the direction of the line of force of the field at a point. A magnetic field-measuring system is provided with two magnetizable cores or bodies and with two windings disposed on the magnetizable cores respectively, an energizing circuit being so connected with these windings as to produce in the two cores a periodically variable flux which in one body has a direction opposite to that of the variable flux in the other body. A common measuring or indicating instrument is connected with both windings so as to respond to the differential effect caused by the resultant magnetization of the two bodies respectively. (A.P.C. 181,719 referred to in the text of the present application is the same as U. S. Patent 1,679,510.)

7762. Cartridges; Marcel Schlumberger, St. Gaudens, Haute Garonne, France. Vested in the Alien Property Custodian. U. S. Patent Application A.P.C. 403,648, published June 1, 1943.

This patent is a division of a patent for Gun Perforator, Serial No. A.P.C. 315,157. It provides a new and improved cartridge for use in well casing perforating apparatus of the above character, which is adapted to comprise a component part of a continuous ignition path extending through the perforating apparatus and including similar cartridges in other units thereof.

7763. Gun-Firing Apparatus; Marcel Schlumberger, St. Gaudens, Haute Garonne, France. Vested in the Alien Property Custodian. U. S. Patent Application A.P.C. 403,649, published June 1, 1943.

This patent is a division of a patent for Gun Perforator, Serial No. A.P.C. 315,157. It relates to apparatus for controlling the firing of a plurality of explosive charges in a body such as the said perforator. New and improved switching means are provided for connecting each of the ignition circuits of the perforator selectively to a single conductor in the supporting cable. Thus, a monoconductor cable may be used for carrying out perforating operations in a borehole.

7764. Well-Casing Perforator; Marcel Schlumberger, St. Gaudens, Haute Garonne, France. Vested in the Alien Property Custodian. U. S. Patent Application A.P.C. 403,650, published June 1, 1943.

This patent is a division of a patent for Gun Perforator, Serial No. A.P.C. 315,157. It relates to a similar well-casing perforating apparatus in which the units are so designed that when assembled, the axes of the guns therein lie along a helix about the periphery of the perforator. New and improved means are provided for firing the guns in successive order. A given interval of time elapses between the firing of each adjacent gun. Means are also provided for indicating at the surface of the earth that a gun has been fired.

7765. Apparatus for Detecting Underground-Lying Metallic Objects; Henri Chircix, Paris, France. Vested in the Alien Property Custodian. U. S. Patent Application A.P.C. 419,545, published June 1, 1943.

The present invention provides a portable apparatus for detecting underground metallic objects such as shells or mines. The construction provides a closed circuit comprising a loop and a condenser in which flows an alternating current of a high and stable frequency. The magnetic field of the loop induces in the underground object eddy currents which produce a counter-field, thus slightly modifying the characteristics of the circuit. The modification is indicated by the apparatus.

7766. Apparatus for Measuring Magnetic Fields; R. D. Wyckoff, Pittsburgh, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U. S. Patent 2,334,593, issued November 16, 1943.

An apparatus for measuring magnetic fields comprising an element of magnetizable material whose permeability is a function of stress and supported to be free to vibrate, piezo-electric crystal means on said element adapted upon energization to vibrate said element to cause periodic stresses therein, means for applying an alternating current to said crystal means whereby to vibrate the element, with consequent periodic variation of the flux induced in said element by the ambient field, means operated by said varying flux for producing an alternating current corresponding thereto, and exhibiting means for said current. - Claims allowed, 8.

7767. Coupling Circuit; H. M. Evjen and W. B. Lewis, Houston, Tex., assignors to Nordel Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,342,628, issued February 29, 1944.

A coupling circuit for coupling a primary circuit carrying direct current or low-frequency alternating current to a D. C. secondary circuit for supplying to said secondary circuit a voltage drop proportional to the primary current for making precision measurements, said coupling circuit comprising a transformer having a magnetic circuit and primary and secondary windings coupled thereby, means connecting said primary winding to be energized from said primary circuit to produce a flux in said magnetic circuit proportional to said energization, means associated with said magnetic circuit to vary the reluctance thereof for effecting corresponding changes in flux, control means actuating said last means cyclically at a controlled frequency so as to produce an alternating current in the secondary winding having a frequency determined by the frequency of variation of said flux and an amplitude varying as a function of the amplitude of the primary current and of the rate of variation of said flux, and a transmission channel connecting said secondary to supply a voltage drop to said secondary circuit, said channel including a filter network having frequency transmission characteristics to compensate for changes in current intensity in said secondary winding due to variations in speed of operation of said control means, so that the voltage drop supplied by said channel to said secondary circuit is

unaffected by changes in speed of operation of said control means and is a function only of the current flowing in the primary circuit. - Claims allowed, 5.

7768. Coupling Circuit; H. M. Evjen and W. B. Lewis, Houston, Tex., assignors to Nordel Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,342,629, issued February 29, 1944.

A coupling circuit for coupling a primary circuit carrying direct current or low-frequency alternating current to a secondary circuit for supplying to said secondary circuit a voltage drop proportional to the current flowing in said primary circuit for making precision measurements, said coupling circuit comprising a primary coil coupled magnetically to a secondary coil, means connecting said primary coil to be continually energized from the said primary circuit by an amount proportional to the current flowing therein so as to set up a flux through said secondary coil proportional to said energization, means rotating said primary coil with respect to said secondary coil to vary periodically the flux through said secondary coil to set up an alternating potential across said secondary coil whose frequency is the same as the frequency of said variations of flux and whose amplitude is a function of the primary current and of the rate of variation of said flux, and a transmission channel connecting said secondary coil to supply a voltage drop to said secondary circuit, said channel including a filter network having frequency transmission characteristics to compensate for changes in current intensity in said secondary winding due to variation in speed of rotation of said primary coil, so that the current passed by said filter network is unaffected by changes in speed of rotation of said coil and is a function only of the current flowing in said primary circuit. - Claims allowed, 5.

7769. Method and Apparatus for Permeability Measurements; G. L. Hassler, Berkeley, Calif., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,345,935 issued April 4, 1944.

In a method for determining the permeability of a porous body to fluid flow, the steps of saturating said body with said fluid to a predetermined degree of saturation, circulating said fluid through said body in a closed cricuit while maintaining said degree of saturation, measuring the rate of flow of said fluid, measuring the difference of pressure existing during said flow between points in said body spaced from each other in the direction of the line of flow of said fluid, changing the degree of saturation of said body, and repeating said flow and pressure measurements for said second degree of saturation. - Claims allowed, 7.

7770. Device for Measuring Extremely Small Angles; H. B. Maris, Riverdale, Md. U. S. Patent 2,347,702, issued May 2, 1944.

Means for measuring extremely small angles, comprising means bearing a irst plane reflecting surface, means bearing a second plane reflecting sur- ace, means normally supporting said first and second surface bearing means ith their reflecting surfaces in inclined face-to-face relation and support- ng said second surface bearing means for relative movement with respect to aid first surface bearing means about an axis normal to the line of inter- ection of the planes containing said normally inclined surfaces, means for irecting a substantially parallel beam of light from a point behind said irst surface past an edge of said first surface at its end remote from said ine on to said second surface, said beam of light lying in a plane normal o said surfaces prior to relative movement thereof and incident on said econd surface at such an angle that it will be reflected a plurality of imes between said surfaces and after having been so reflected will emerge t substantially its point of incidence, whereby relative movement of said urfaces about said axis will cause said emerging beam to swing through an ngle depending on the magnitude of relative movement of said surfaces and he number of reflections between said surfaces. - Claims allowed, 12.

771. Method of Soil Analysis for Location of Oil Deposits; A. O. Beckman, Altadena, Calif., assignor to American Geochemical Corporation, Long Beach, Calif., a corporation of California. U. S. Patent 2,348,103, issued May 2, 1944.

A method of geochemical survey for petroleum deposits, which comprises aking samples of soil at spaced intervals over the area to be surveyed, etermining the sulfide content of said soil samples, and determining the ocation of petroleum deposits by selecting the significant high-sulfide alues and correlating the same with reference to the locations at which amples yielding such significant high values were obtained. - Claims llowed, 6.

772. Magnetic Seismometer; O. S. Petty, San Antonio, Tex. U. S. Patent 2,348,225, issued May 9, 1944.

A magnetic seismometer having, in combination, a tubular casing, an rmature fixed coaxially therein, a steady mass mounted in the casing and or movement relative to the casing and armature, said steady mass com- rising only a permanent magnet, pole pieces therefor and a coil, and dia- hragm springs connecting said relatively movable parts, said springs having different natural frequencies of vibration. - Claims allowed, 7.

773. Apparatus for Recording Wave Form Signals; Lorenzo Manzanera, San Antonio, Tex., assignor to O. S. Petty, San Antonio, Tex. U. S. Patent 2,348,401, issued May 9, 1944.

In apparatus for the multiple recording of seismic signals, means for feeding a sensitized strip in the direction of the length thereof, means to record on said strip a plurality of traces extending lengthwise of the strip,

and timing mechanism for recording on said strip a succession of transverse lines representing equal time intervals with certain of said lines intersecting all of said traces and with the major number of said lines, disposed intermediate said first-named lines, intersecting only those traces immediately adjacent each edge of the strip. - Claimes allowed, 6.

7774. Seismic Surveying; J. O. Parr, Jr., San Antonio, Tex., assignor to O. S. Petty, San Antonio, Tex. U. S. Patent 2,348,409, issued May 9, 1944.

In apparatus for use in seismic surveying, the combination with a plurality of seismometers, of separate amplifying and recording devices associated therewith for separately recording energy representative of earlier arriving seismic waves, means for combining the signal energy from at least two of said seismometers and for delivering the combined energy to one of said recording devices, means operable on the arrival of seismic energy at that seismometer which is more remote from the source of the seismic disturbance for initiating operation of said first named means and for thereafter varying with time the extent to which such energy is combined by said first named means. - Claims allowed, 9.

7775. Method for Correlating Seismographic Curves; O. S. Petty, San Antonio, Tex. U. S. Patent 2,348,411, issued May 9, 1944.

In a method of geophysical exploration wherein a detonation is set off at a point in the earth's surface, the resulting seismic wave impulses recorded on seismograms, at one or more stations spaced from the point of detonation, in the form of seismographic curves, plotted across time-interval lines the spacing of which is either nonuniform or according to different scales of measurement, or subject to both such disconformities, and the several seismographic curves correlated: The steps of successively transcribing two or more of such curves onto a common surface having uniformly spaced time-interval indicia inscribed thereon, each of said curves being transcribed section by section, a section being the portion of the curve which lies between adjacent time-interval lines, each point on each section of each transcribed curve occupying the same relative position with respect to the bounding time-interval indicia on said common surface that the corresponding point of the original curve occupied relative to the adjacent time-interval lines on the original seismogram from which said curve was transcribed. - Claims allowed, 7.

7776. Method for Determining Permeability; J. A. Lewis, Dallas, Tex., assignor to Core Laboratories, Inc., Dallas, Tex., a corporation of Delaware. U. S. Patent 2,348,985, issued May 16, 1944.

The method of measuring the permeability of a permeable porous material comprising the steps of supplying fluid under pressure to a predetermined restricted area of an approximately plane unrestricted surface of a sample

f said material, said sample being sufficiently large with respect to said redetermined area that substantially all of the fluid entering said surace leaves said sample through the same surface at which it enters said ample but outside said restricted area whereby accurate preshaping of said ample and mounting of said sample in a fluid-tight mounting is rendered nnecessary, measuring the flow of fluid to said sample, measuring the fluid ressure of the fluid entering said surface of said sample, and correlating aid two measurements to obtain the value of the permeability of said ample. - Claims allowed, 4.

7777. Sensitivity Control for Seismic Recording; Eugen Merten, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,349,186, issued May 16, 1944.

In a seismograph system comprising in circuit a detector adapted to generate electric impulses, an amplifier adapted to amplify said impulses, nd a recorder adapted to record said impulses, a variable resistance hunting said circuit between the detector and the amplifier, time-responsive means for changing the value of said resistance between an initial and final value during the period of recording of said impulses, and means esponsive to the magnitude of the impulses originating in the detector or varying the rate of change of said resistance during said period of ecording. - Claims allowed, 6.

7778. Well-Logging Instrument; S. A. Scherbatskoy, Gilbert Swift, R. E. Fearon, and Jacob Neufeld, Tulsa, Okla., assignors to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,349,225, issued May 16, 1944.

Apparatus for well surveying that comprises an instrument adapted to e lowered into a well, a cable for supporting said instrument in the well nd connecting it electrically to surface equipment, surface equipment responsive to measurements made by said instrument and a recorder operated by said surface equipment, the instrument in the well including an ionization chamber responsive to radioactive radiations, connected into a null system circuit the balance of which is adapted to be adjusted by the surface equipment, and means for sending signals of a plurality of frequencies to the surface for indicating whether or not the null system is in balance and if not, the direction of unbalance. - Claims allowed, 21.

7779. Gas Detection; R. L. Doan, Bartlesville, Okla., assignor to Phillips Petroleum Company, a corporation of Delaware. U. S. Patent 2,349,250, issued May 23, 1944.

The method of analyzing soil gas for hydrocarbons heavier than methane in the presence of methane contained in the soil gas which comprises passing the soil gas into a vessel into contact with a filament in the vessel, cutting off all flow of gas to said vessel and allowing turbulence of the gas

in the vessel to subside, thereafter heating the filament to a temperature in the range of 900° F. to 1,250° F. by passage of electric current therethrough, and determining the quantity of hydrocarbons heavier than methane present in the soil gas by observing the rate of combustion thereof as evidenced by changes in the electrical resistance of the filament due to heat liberated by combustion of hydrocarbons heavier than methane. - Claims allowed, 3.

7780. Method for Geophysical Prospecting; C. A. Moon, Caracas, Venezuela, assignor to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,349,366, issued May 23, 1944.

Method of simultaneously drilling and prospecting a well bore that comprises the following sequence of operations: Partially withdrawing the drill string from operative position within the well bore; placing a prospecting instrument of a type capable of measuring radiations which will pass through the drill stem within the partially withdrawn drill stem near the drill bit; returning the drill string to its original position at a measured rate of movement; removing the prospecting instrument from the drill stem; and correlating indications from the prospecting instrument with measurements of movement of the drill string to obtain indications of the character of formations traversed by the well bore. - Claims allowed, 9.

7781. Oil Prospecting Method; M. S. Taggart, Jr., Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,349,472, issued May 23, 1944.

A method for prospecting for petroleum deposits which comprises subjecting samples of the surface soil from spaced points in the area under investigation to the action of hydrocarbon gas in a sealed zone and determining the amount of the hydrocarbon gas taken up by the individual soil samples. - Claims allowed, 10.

7782. Well-Logging Method and Device; R. E. Fearon, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,349,712, issued May 23, 1944.

The method of determining the nature of formations penetrated by a drill hole which comprises inserting in the drill hole a neutron-emitting source and measuring gamma-ray radiations from the formations as influenced by the said neutron-emitting source at different depths therein. - Claims allowed, 4.

7783. Method and Apparatus for Geophysical Exploration; Bruno Pontecorvo, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,349,753, issued May 23, 1944.

A method of geophysical prospecting that comprises discriminating between radiations of varying energy that comprises utilizing said radiations to form beta radiations, detecting said beta radiations, causing said detected beta radiations to impinge upon a partition, detecting the beta radiations that are able to pass through said partition and comparing the results of the detections. - Claims allowed, 18.

7784. Borehole Logging Apparatus; G. A. Smith, Philadelphia, Pa., assignor to Sperry-Sun Well Surveying Co., Philadelphia, Pa., a corporation of Delaware. U. S. Patent 2,350,371, issued June 6, 1944.

Borehole logging apparatus comprising means for generating acoustic waves in strata surrounding a borehole, means comprising amplifying feedback devices forming, with said generating means and the strata, a system providing sustained oscillations having at least one substantial sinusoidal component, said system having variations in its operating characteristics depending upon the strata, said feed back devices being frequency-selective to sustain oscillations only of significant character, and means for indicating the variations of said characteristics with the strata. - Claims allowed, 8.

7785. Magnetic Direction Indicating Instrument; Shelley Krasnow, New York, N. Y., and J. M. S. Kaufman, Washington, D. C. U. S. Patent 2,350,402, issued June 6, 1944.

In a magnetic compass for indicating the direction of the magnetic meridian, a moving dial supported so as to be rotatable in a substantially horizontal plane and to point in the direction of the magnetic meridian, a plurality of magnetic elements affixed to the said moving system so as to cause the orientation thereof, the said magnetic elements being rigidly interconnected to form an integer, the said integer being movable relative to the remainder of the moving system to permit adjustment of the magnetic elements relative to the moving system, and clamping means to clamp the integer containing the magnetic elements after adjustment has been made, the said magnetic elements being in the form of tapered members, being tapered in both the horizontal and vertical planes, and having their enlarged portions nearest to the center of rotation, and their smallest portions remote from the center of rotation, the said disposition serving to reduce the moment of inertia of the magnets about the center of rotation and further serving to cause a minimum of disturbance in the fluid in which the magnets are immersed when rotation takes place. - Claims allowed, 2.

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